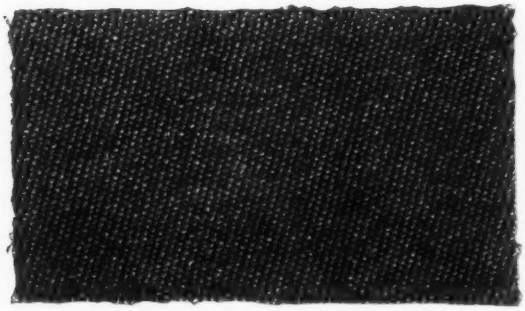
AMERICAN
DYESTUFF
REPORTER

1922

# GEIGY COMPANY, Inc.

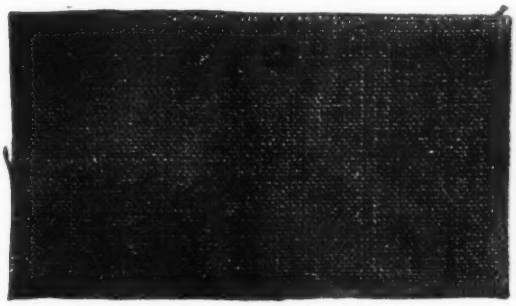
89-91 Barclay Street,
New York City

## *ANILINE COLORS*



FAST LIGHT WOOL GREEN S

This product when dyed with Acetic Acid produces a Green of excellent fastness to light. When dyed top Chrome or Chrome bottom produces a bright Green of good fastness to light and milling.



DIPHENYL VIOLET B C

This is a Direct Violet possessing good fastness to light, perspiration, calendering and storing.

**Sole Selling Agents for J. R. GEIGY S. A., Basle, Switzerland**
Established 1764

Main Office J. R. Geigy S. A., Basle, Switzerland; in Great Britain
**The Geigy Colour Co., Ltd., 35-37 Dickinson St., Manchester**

BOSTON PROVIDENCE PHILADELPHIA TORONTO COLUMBUS, GA.

# Old Man "Good Enough" Sees the Handwriting on the Wall

OLD MAN GOOD ENOUGH was the offspring of Textile Prosperity and the parent of Waste and Inefficiency. He was old looking and infirm even at birth, but his parent Prosperity said he was "Good Enough."

Textile Prosperity pampered and stuffed Good Enough until he grew fat and more spoiled and shiftless than ever. Good Enough wasted his parent's earnings recklessly, shamelessly, thousands and thousands of dollars a year.

**Quietly and unobtrusively he slunk out of the door and has not been seen since.**

People warned Textile Prosperity regarding Good Enough's recklessness, pleaded with him to cast out the prodigal son. They pointed to Efficiency, a one time acquaintance of Textile Prosperity, and said, "Make him your favorite. He can save you thousands of dollars which Good Enough is now wasting." But Textile Prosperity turned a deaf ear to all these pleadings, and answered with a smug smile, "I'm making lots of money. I guess Good Enough is 'good enough for me.'"

But there came an end. Textile Prosperity sickened from too much of everything and died. He was succeeded by Depression, who remained in authority for many months and who still pampered Good Enough, partly from precedent and partly because he was too weak to do otherwise.

Then Efficiency, who had been growing weak from neglect and inactivity, began to realize the great need for his guiding hand and by an heroic effort pulled himself together and took command. He assembled about him those who had previously advised Textile Prosperity in vain and found in their words much that was good; particularly from one named Franklin Process:

"It is now costing you around 7 cents per pound for winding. By eliminating the old, expensive, wasteful methods of backwinding, such as from skeins and chain warps and substituting my simple, direct method, I have in many cases saved as much as 5 cents per pound in the winding room. With your production of a million pounds a year, this saving would amount to $50,000.00.

"Perhaps in your case the saving will only be 2 or 3 cents per pound, but even so, the annual saving will be worth while, and then you have a saving of 50% in floor space, 50% or more in fuel and water, due to the short dye bath, —1 gallon of liquor to a pound of yarn —and——"

Old Man Good Enough did not wait to hear. He saw the handwriting on the wall and realized that his days of special privileges were over. Quietly and unobtrusively he slunk out the door and has not been seen since.

It is rumored that his offsprings, Waste and Inefficiency, will follow him shortly. *Are YOU interested in saving thousands of dollars a year? If so, we suggest that you write us for complete information regarding Franklin Dyeing Machines. If they are adaptable to your business we can show you how they will effect remarkable economies and can cite many cases where they have already done so.*

*Franklin Machines are used to dye fine single worsted yarns that cannot be dyed by any other process, fine splicing cotton yarns for hosiery, hard twisted cords for tire fabrics, fire hose and cable cords, Merino yarns, worsted yarn on jackspools, glazed yarns and soft yarns for electric wire covering, cotton yarns for shirtings, voiles and dress goods, etc.*

## FRANKLIN PROCESS CO.

Philadelphia PROVIDENCE Manchester, Eng.

N. Y. Office, 72 Leonard St.

SOUTHERN FRANKLIN PROCESS CO.
Greenville, S. C.

American Dyestuff Reporter, Vol. XI, No. 9. Oct. 23, 1922. Published biweekly by Howes Publishing Co., Woolworth Building, New York. N. Y. Domestic subscription, $5.00; Canadian, $5.50; foreign, $6.00. Entered as second-class matter Nov. 6, 1919, at the New York, N. Y., Post-office, under the Act of March 3, 1879. Copyrighted, 1922, by Howes Publishing Co.

# MATHIESON Chemicals

## Caustic Soda in Liquid Form

99% NaOH
GUARANTEED

MANY manufacturers are now using caustic soda in liquid form.

They have found that the use of liquid caustic effects a worth-while saving over the use of the solid material packed in drums. It reduces the cost of handling and dissolving.

**Mathieson Liquid Caustic Soda — analyzing less than 0.50% of Sodium Carbonate, less than 0.20% of Sodium Chloride, less than 0.07% of Sodium Sulphate; permitting us to guarantee a minimum of 99.00% Sodium Hydroxide — is shipped in tank cars from Niagara Falls in a non-freezing solution averaging 25% of Solid Sodium Hydroxide, or about 32 degrees Baumé.**

The use of Mathieson Liquid Caustic Soda assures you economical operation and uniform results, at the same cost.

**MATHIESON ALKALI WORKS** *INC.*
25 West 43rd. Street
NEW YORK CITY
PHILADELPHIA CHICAGO
PROVIDENCE CHARLOTTE

**Deal Direct with the Manufacturer**

# F. E. ATTEAUX & COMPANY, Inc.

**172-178 Purchase Street, Boston**

Sole Selling Agents for

**Palatine Aniline & Chemical Corp.**

**Poughkeepsie, New York**

Manufacturers of

**ACID—CHROME—DIRECT and SULPHUR COLORS**

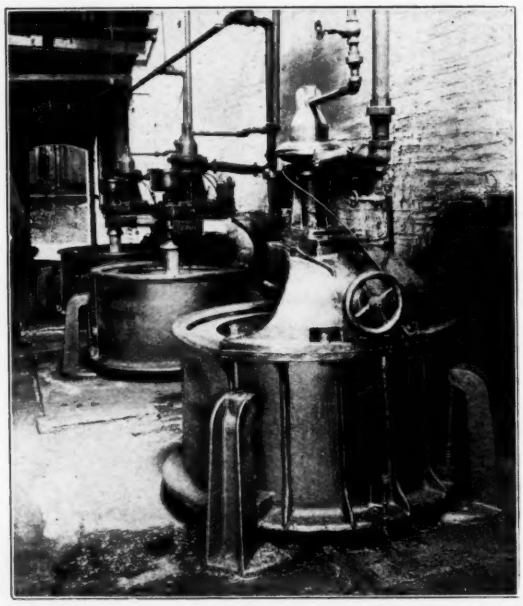
---

Manufacturers' Agents for

HEMATINE CRYSTALS AND ALL DYEWOOD PRODUCTS

**F. E. ATTEAUX & COMPANY, Inc.**

BOSTON NEW YORK PHILADELPHIA CHICAGO



# FLETCHER

## STEAM TURBINE DRIVEN

# EXTRACTORS

are more than making good under the severest conditions. Increased output at less cost is inevitable where these machines are installed.

Other dependable types are belt-driven, vertical motor-driven and electric underdriven.

**FLETCHER WORKS** INCORPORATED
Formerly Schaum & Uhlinger
Established 1850

**GLENWOOD AVENUE, AT SECOND STREET, PHILADELPHIA, U. S. A.**

New England Representatives: HURRICANE ENGINEERING COMPANY, 53 STATE STREET, BOSTON, MASS.
Western Representatives: R. R. STREET & CO., 28 N. CLINTON STREET, CHICAGO, ILL.
Southern Representative: H. MORSHEAD, GLENWOOD AVENUE and SECOND STREET, PHILADELPHIA, PA.

# SULFUR COLORS
## of Unusual
## Concentration—Brilliancy—Solubility

Sulfogene Yellow GG
Sulfogene Yellow D
Sulfogene Brown GO
Sulfogene Golden Brown G
Sulfogene Golden Brown R
Sulfogene Cutch O
Sulfogene Ochre G
Sulfogene Dark Brown GN Ext.
Sulfogene Bordeaux G
Sulfogene Bordeaux B
Sulfogene Green M Conc.
Sulfogene Navy Blue GL Conc.
Sulfogene Navy Blue RL Conc.
Sulfogene Carbon H Conc.
Sulfogene Carbon M Conc.
Sulfogene Carbon 8G Conc.

A trial will convince you of their excellence.

E. I. du Pont de Nemours & Co., Inc.
*Dyestuffs Department*
WILMINGTON DELAWARE
BRANCH OFFICES:
New York Boston Providence
Philadelphia Chicago
Charlotte, N. C.

STANDARD DU PONT DYESTUFFS UNIFORM

# "SILK BROWN G"

A new, level dyeing, fast acid color for Wool or Silk Also an excellent neutral dyeing color. Dyes Silk or Wool in neutral or even in slightly alkaline bath.

Heretofore the shading of light colors on silk or wool in a neutral bath was usually accomplished with red and yellow, with results far from satisfactory.

"SILK BROWN G" brings relief to the union dyer as a mellow brown to shade greys and light fancy colors on silk or wool in union, as well as a ground color for Tan, etc. Is extremely level dyeing either when dyed in an acid bath or neutral bath.

*"Silk Brown G"*

**Manufactured only by**

ALTHOUSE CHEMICAL COMPANY, *Office and Plant: READING, PA.*

# DYESTUFF IMPORTATION

The removal of the Dyestuff Embargo has created an entirely new condition which we must face.

Having in mind the interests of the Dyestuff Consuming Industries who require **foreign-made colors** as well as those made by **American Dyestuff Manufacturers,** we have organized an **Import Department** and are now in a position to supply such products.

Being thoroughly familiar with the foreign range of Dyestuffs, past and present, we solicit inquiries.

As MANUFACTURERS and IMPORTERS we are ready and able to meet the most exacting requirements of Dyestuff Consumers.

***Samples and Prices Cheerfully Furnished***

## JOHN CAMPBELL & COMPANY

**75 Hudson Street** ESTABLISHED 1876 **New York, N. Y.**

**Branches:**

**Boston** **Providence** **Chicago** **Philadelphia** **San Francisco** **Toronto**

# ESSEX DYESTUFFS

**DIRECT YELLOW CF**
**CHRYSOPHENINE CONC.**
**DIRECT YELLOW 2G**
**DIRECT FAST YELLOW B**
**COTTON YELLOW 5G**
**DIRECT BROWN 2R**
**DIRECT BROWN 2Y**
**DIRECT FAST BROWN M**
**DIRECT ORANGE R**
**DIRECT ORANGE 2RE**
**DIRECT ORANGE 5RE**
**DIRECT PINK NY**
**DIRECT PINK 2Y**
**DIRECT PINK SX**
**DIRECT FAST SCARLET B**
**ERICA 2GN**
**DIRECT ROSE FFB**
**DIRECT ROSE NB**
**DIRECT GREEN 2B**
**CHROME GREEN B CONC.**

## ESSEX ANILINE WORKS, Inc.

*Manufacturers of Aniline Colors.*

**88 Broad Street, Boston, Mass.** **Factory at South Middleton, Mass.**

**The Grasselli Chemical Co, Sole Sales Agents, 117 Hudson St., New York City**

# SANDOZ

## ANILINE DYES FOR ALL TRADES

SANDOZ

**We carry a complete line at all Branches**

***For samples and prices apply at any of our offices***

**SANDOZ CHEMICAL WORKS**
**INCORPORATED**

238-240 Water St. NEW YORK
12 So. Front St. PHILADELPHIA
36 Purchase St. BOSTON
175 Market St. PATERSON
Commercial Bank Bldg. CHARLOTTE, N. C.



***THE EMBARGO DIED HARD***

—BUT as a result protection to the American Industry is assured by rates giving more than adequate protection, and the consumer can get what he wants without dictation as to what he shall use.

The following dyestuffs

**INDANTHRENE**
**THIO-INDIGO**
**HELINDONE**
**HYDRONE**
**ALGOL**

will be imported by us direct from the manufacturers—

FARBWERKE VORM. MEISTER, LUCIUS & BRÜNING
FARBENFABRIKEN VORM. FRIED. BAYER & CO.
CHEMISCHE FABRIK GRIESHEIM-ELECTRON
BERLIN-ACTIEN GESELLSCHAFT FÜR ANILIN-FABRIKATION
LEOPOLD CASSELLA & CO.
FARBWERKE-MÜHLHEIM
KALLE & CO.

*Dyestuffs manufactured by*
**CONSOLIDATED COLOR & CHEMICAL CO.**
**CENTRAL DYESTUFF & CHEMICAL CO.**
**WILLIAMSBURG CHEMICAL CO.**
*and other American manufacturers distributed by*

H. A. METZ & CO. Inc.
One-Twenty-Two Hudson Street, New York City.
*Boston Philadelphia Providence Chicago Charlotte San Francisco*



N. T. Y.

# INDOPHENAL BLUE

**ALL SHADES**

**FROM SKY BLUE TO BRILLIANT REDDISH TYPE**

*These products are especially adapted to all kinds of dyeing where a better grade of Sulphur Color is required*

*They are distinguished by their excellent solubility, fastness to light, washing, rubbing, alkali and acid.*

**MADE BY**

## TOWER MANUFACTURING CO., Inc.

**DYESTUFFS DEPARTMENT**

**SALES OFFICE AND FACTORY**
**85 to 105 DOREMUS AVENUE NEWARK, NEW JERSEY**

# ATLANTIC PATENT BLACK

THE UNRIVALED SULPHUR BLACK that "STAYS BLACK"

SOLUBLE FAST BLOOMY BRILLIANT

An intense fast Black possessing the greatest solubility superior and lasting bloom and brilliancy and thorough penetration

ECONOMY

The low percentage required to produce a deep black substantiates the claim for economy of use

UNIFORMITY

Uniformity of Atlantic Products is best exemplified by repeat orders which specify "SAME AS LAST SHIPPED"

ATLANTIC YELLOWS
ATLANTIC BLUES
ATLANTIC BROWNS
ATLANTIC MAROONS
ATLANTIC GREENS

ATLANTIC DYESTUFF COMPANY
Portsmouth N.H.
New York Charlotte Chicago Philadelphia Providence

Established 1895

# BOSSON & LANE

*Manufacturers of*

The Original

**BLEACHING OIL**

for boiling out Cotton, to produce a foundation for a Pure White

High Grade Sulphonated and Saponified

**CASTOR OIL PRODUCTS**

**Para Soap Oil**

Solvents and Assistants for cleaning all Textiles

B & L Bleachers' Bluings and Tints

*Works and Office, ATLANTIC, MASS.*

# SOLD OUT

## WHITTAKER'S BOOK

## *"The Testing of Dyestuffs in the Laboratory"*

THE sixth importation of this newest and most popular work by Mr. Whittaker is rapidly becoming exhausted owing to the continued demand. We can supply, however, a limited number to those who will act promptly.

"The Testing of Dyestuffs in the Laboratory" presents in condensed form the results of over twenty years' practical experience. It deals in general with the dyestuff testing laboratory and its functions and in particular with methods for the testing and evaluation of the different types of dyestuff, including the natural colors. Every dye chemist should order his copy NOW to insure early delivery.

PRICE $4.50, POSTAGE PAID

HOWES PUBLISHING COMPANY

4109 Woolworth Building NEW YORK CITY

# Contents of This Issue

October 23, 1922

The Manufacture of Chrome Ooze Calf... 297
William C. Jackson

Cotton Softeners ..... 299
P. F. Estey

Preparation of Woolens for Red Dyeing... 300
Charles A. Everett

Mechanical Appliances for Pumping Chemical Solutions. Part I ..... 301
A. K. Fischer

Dyeing with Indigo ..... 306

Things Every Textile Chemist and Colorist Should Know:
No. 8—The Soxhlet Extractor..... 307

The 1923 Spring Color Card ..... 308

Proceedings of the American Association of Textile Chemists and Colorists:
Eighth Research Committee Meeting.... 309
Rhode Island Section Meeting..... 309
Nominating Ballots and Questionnaires Mailed to Members ..... 309
Ninth Council Meeting ..... 310
New York Section Meeting ..... 311
In Memoriam E. G. Quin ..... 312

Notes on the Dyeing of Direct Blacks on Cotton Piece Goods. Part III—Concluded 313
Raffaele Sansone

American-Made Colors:
Group II—Basic Colors ..... 315

Artificial Silk and Its Applications in the Textile Industry ..... 317
P. E. King, A. I. C.

Bleaching and Dyeing Jute ..... 319

Improved Wool Scouring ..... 322

Lime in the Dyehouse ..... 323
Elton R. Darling

Bleaching in Laundries ..... 325

Editorials
Foreign Recognition of a Necessity..... 327

**Bleachers!**

Call the attention of your Selling Agent to the ability to furnish "Better Bleached Goods" through Peroxide bleaching, giving a permanent white without weakening, at same cost.

Those selling points will increase his sales, without price cutting.

We are experts.

THE ROESSLER & HASSLACHER CHEMICAL CO.
New York

# ISO-CHROME COLORS

These products are proving of exceptional interest on account of their simplicity of dyeing by the one-bath method; their fullness of shade; fastness; and level dyeing qualities.

## JENNINGS & COMPANY

INCORPORATED

**93 Broad Street, Boston, Mass.**

# TECHNICAL BOOKS

If you are in the market for books on technical subjects — dyeing, finishing, bleaching, etc. — communicate with us and it is probable that we can supply your needs. We shall at all times be glad to submit lists of books covering any special lines.

**We call particular attention to**

### A TEXTBOOK OF DYE CHEMISTRY

**By G. VON GEORGIEVICS**

This is a new edition of a former volume by the same author, entitled "Chemistry of Dyestuffs," and has been thoroughly revised and brought down to date by Dr. Eugene Grandmougin—translated by Frederick A. Mason. The new edition describes minutely the chemical properties of all dyestuffs, including the natural colors, and contains particularly a new chapter on the Vat Colors

**PRICE $12.50**

### DYERS' MATERIALS

**By PAUL HEERMANN**

An introduction to the examination, valuation and application of the most important substances used in dyeing, printing, bleaching and finishing. Translated by Arthur C. Wright. Second edition, revised and enlarged by H. B. Stocks. **PRICE $3.00**

## HOWES PUBLISHING CO.

**4109 Woolworth Building NEW YORK CITY**

## *I. LEVINSTEIN & CO.*

*INCORPORATED*

*281-5 Franklin Street*
*Boston, Mass.*

*offer a*
*full line of*
*American made*
*and*
*British made*

## *DYESTUFFS*

*They represent*
***British Dyestuffs Corporation, Ltd.***
*Manchester, England*
*They are introducing to this country*

*DUROPRENE* — *An acid and alkali proof varnish*

*VELVONA* — *A new inert base and filler*

# Consult Us About Your Dyeing Problems

The services and advice of an expert chemist and a well equipped laboratory are at your disposal without cost, except when special research or experimentation is necessary, when the charges will be of a minimum nature.

**American Dyestuff Reporter**
**Woolworth Bldg. New York City**

QUALITY COLORS
UNITED STATES COLOR AND CHEMICAL CO.

**Anthranol Chrome Blue Black AR**

**Dyes chrome mordant or top chromed. Recommended for fast shades of navy blue or all classes of stock. On account of its shade, level dyeing properties and solubility it is especially suitable for piece dyeing**

**Anthranol Chrome Brown W**

**Dyes chrome mordant or top chromed. Is fast to light and fulling. The most level dyeing brown on the market.**

**Acid Chrome Blue F 4 B**

**Similar to the pre-war Chromotrope F 4 B. Of special interest for dyeing piece goods to leave silk white.**

# United States Color & Chemical Company, Inc.

**93 Broad St. Boston, Mass.**

**New York Office: 25 Howard St.**

**FACTORIES:**
**NEW ENGLAND ANILINE WORKS, Inc.**
**Ashland, Mass.**

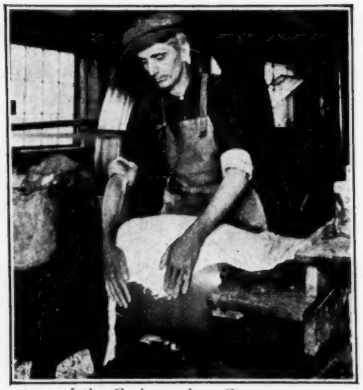
**GARFIELD ANILINE WORKS, Inc.**
**Garfield, N. J.**

NATIONAL U.S.A. DYES

# Delicate Grays and Ecru Shades on Ooze Calfskin

Grays and tans have always predominated in Ooze Calfskin, but the coming Spring season will see a wider variety than ever in the more delicate shades. Fashion is pointing toward such modish tones as "Fog" and "Cruiser" in the grays, and in the browns, "Briar," "Rembrandt" and "Congo." "Beige" will continue popular. "Pebble," which corresponds to the "Ivory" of the Shoe trade, is a new color.

The problem presented to the dyer of Ooze Calfskin is to hold a level, even tone, guarding against any off-shade that might mar the soft beauty of the color. For these effects "National" Sulfur Dyes are recommended.



Courtesy of the Carborundum Co.
*The Leather Worker: wet-wheeling calfskin to secure the popular ooze finish*

***National Sulfur Brown C G***
***National Sulfur Brown 3 R***
***National Sulfur Black B G Extra Conc.***

When properly applied these dyes will impart a silky feel to the skins, give level shades where light colors are required, and retain all of the fibrous strength of the leather. No vegetable mordants or pigments are necessary; the dyeing is done in one operation.

Complete information regarding the application of "National" Sulfur Dyes will be given upon request, and tanners are invited to use freely the services of our special leather laboratory for the solution of their color problems.

**National Aniline and Chemical Company, Inc.**

*New York Chicago Charlotte Toronto Philadelphia*
*Boston Hartford Montreal Providence San Francisco*

# AMERICAN DYESTUFF REPORTER

*"Circulated Everywhere Dyestuffs Are Used"*

**Devoted to the practical application of dyestuffs in all industries; especially to textile chemistry—the science and practice of scouring, bleaching, dyeing and finishing.**

VOLUME XI NEW YORK, OCTOBER 23, 1922 NUMBER 9


# The Manufacture of Chrome Ooze Calf

**Class of Stock Required—The Tanning Process—Useful Suggestions for Coloring Various Shades—Procedure in Finishing**

By WILLIAM C. JACKSON

THE manufacture of chrome ooze calf is carried on by comparatively few tanners, which is due to several reasons. Many are not equipped to handle it and many have tried it, but, not meeting with immediate success, have discarded it for the more staple lines. Nevertheless, for one who has an established trade in ooze, the market is fairly steady. Although the process is short, requiring only four weeks to put the stock through, it calls for an infinite amount of attention to details, as only a slight deviation will often cause a change in shade of the finished leather, this being especially true of grays.

In the selection of raw stock the best ooze leather is made from 4/5 pound green salted city skins. Slunks are too uncertain, often being tainted; and while the nap is much finer, the skins are very light and tear readily in the process of manufacture. Lights and deacons come in the same class. A 5/7 pound skin is liable to be too large. No skin that will finish over 8 feet should be put into ooze, as the nap is too coarse, not only in the neck and flanks but also in the body. For this reason B. A. nonatos are dangerous skins to use, as the percentage of large skins is high and the grains poor.

If the beaming process, that which will give a good tight grain is the one which is required for ooze leather; in other words, no change should be made in this department from that which is required for grain leather.

The most suitable chrome tannage is the glucose one-bath tan liquor made by dissolving 50 pounds bichromate of soda in 12 gallons lukewarm water and adding to it 45 pounds 66 deg. Be. sulphuric acid which has been diluted by adding it to 2 gallons of water. Mix thoroughly and add very slowly 17½ pounds glucose or corn sugar diluted with 4 gallons hot water. The chromic acid solution may have to be warmed slightly until the reaction starts, and then it will work itself; but extreme care must be taken to add the glucose solution very slowly pint by pint until it is all in. The liquor should be allowed to work overnight and next day diluted with water to make 1 gallon of liquor for every pound of chrome used. The above proportion of acid is correct for stock pickled with 2 per cent sulphuric acid. If a lower pickle is used, increase the acid in the tan liquor up to 50 pounds.

In using, take 40 gallons liquor for 1,000 pounds drained pickled stock, and after opening up stock (1,000 pounds) in 60 pounds salt and 100 gallons water at 110 deg. Fahr. for fifteen minutes, feed in tan liquor in three feeds thirty minutes apart. Next make up a solution of 17½ pounds bicarbonate of soda in 25 gallons of water at 110 deg. Fahr. and add in four feeds fifteen minutes apart and run one hour after last feed. Stock may then be taken out and piled on the floor for two days and neutralized with 1 per cent bicarbonate of soda, washed and set out ready for splitting.

At this point the ooze may be sorted out and split to 3 ounces and shaved very clean; in other words, get below the veins as much as possible.

## Fat-Liquoring

The skins may now be made up into 400-pound mill loads, wet up in clean drums with two barrels of water, 100 deg. Fahr., to which has been added 2 pounds bicarbonate of soda, run thirty minutes, and drained. On the day previous stir up 20 pounds flour in 6 gallons cold water until fairly smooth, then dilute to 15 gallons with cold water and let stand overnight. It is important to mix the flour on the day previous to using in order to avoid lumps, which will appear on the skins as dough. Winter rye is best, but winter wheat will work very satisfactorily, and a cheap grade gives just as good results.

Just previous to fat-liquoring add to the flour paste 24 pounds No. 2 egg yolk diluted to two pails with warm water. Dilute the whole to 20 gallons and warm to 90 deg. Fahr. Put in through the door and run one hour; horse up and hang the same day in a cool room until dry.

When stock is thoroughly dry it should be put, grain to grain, into sawdust sufficiently damp to require four or five hours before the skins show signs of wetting through. The stock should now be taken out, piled down and covered until the next day, when it is ready for staking. Holding overnight is necessary to avoid tearing on the staking machine. Stake on a Slocomb belly-staker with a dull steel blade, flesh to the blade. Next, tack on boards until dry, and after stripping put again in damp sawdust for one hour and stake as before and send to the buffing room.

### Buffing

The buffing should be done on a 22-inch overshot crown-face wheel, speed 1,650 r.p.m., with No. 100 Turkish emery, giving the skins a good cutting but being careful not to cut down into the blue, or black streaks will show up after coloring if sumac and copperas are used. Finish off on another wheel with No. 200 Turkish emery. Stock should now be inspected for poor buffing and sorted for weights and grades as required.

The buffing is the most important part of the whole process, for upon it depends the condition of the nap. It is absolutely necessary to have a speed of 1,650 r.p.m., as a higher speed will cut too much and burn the stock, and a lower speed will not cut the fibers but will pull them and give a coarse nap.

### Coloring

The skins are now ready for coloring and should be made up into mill loads of 1,500 feet. Put the dry skins into the color drum and wet up with two barrels of water 130 deg. Fahr. for thirty minutes and add one barrel of water containing 2 pounds borax, 100 deg. Fahr., and run fifteen minutes; drain and rinse ten minutes with warm water and drain again.

Up to this stage the process has been of a general nature and may be followed in any tannery; but when it comes to matching a shade, that is wholly up to the ingenuity of the colorer, and no cut-and-dried formula can be given for any particular shade. That must be worked out individually. Perhaps, however, a few general hints may be useful in the building up of the various coloring processes.

### Blacks

For blacks there are two principal methods. The developed black process consists of impregnating the stock with Diazine colors and then diazotizing and developing the color, finally topping with a Basic Black and fat-liquoring. This process is a dangerous one except in the hands of an experienced chemist, and even then will not give a full plump piece of leather and has a tendency to be either gray or rusty.

The other process consists in using about 3 gallons of a clarified Quebracho extract with the same Diazine colors without developing, followed with logwood and copperas and topping with a Basic Black, then fat-liquoring with an acid fat-liquor. A very useful hint is to add to the fat-liquor about 2 ounces of Auramine O, which helps to jet the shade.

### Browns

For dark browns a very good method is as follows: Mix up cold in one barrel 3 gallons sumac extract in 30 gallons water and in another barrel mix in 30 gallons cold water the following dissolved separately: 2 pounds copperas, 5¼ ounces titanium potassium oxalate, 8 ounces Jet Nigrosine. Add both barrels to stock simultaneously and run thirty minutes; drain and rinse. Now top with about 3 pounds Bismarck Brown R shaded with Methyl Violet and Malachite Green. Run twenty-five minutes, drain, rinse five minutes with warm water and fat-liquor with 1¾ gallons acid fat-liquor (33 per cent oil), 1 gallon No. 2 egg yolk.

### Grays

For grays use about 3 gallons sumac extract, striking with copperas until sufficiently dark, and then add a paste consisting of the proper proportion of lithopone, blue clay, burnt umber and raw sienna. Run fifteen minutes and add the same fat-liquor as on the browns, using an ounce or so of Auramine O if necessary.

### Finishing

The skins should be horsed up at once and hung the same day in a hot room or drying tunnel until bone-dry. If dried on sticks, be sure to put the grain to the sticks. When dry put into sawdust, grain to grain, for two hours, or until the stock feels dampened. Stake on Slocomb with rubber roll and dull steel blade without pad, grain to the blade. Dry-mill for two hours, or until the skins are soft and show no mottle. Horse up grain to grain and tack flesh up. When dry, strip from boards, horse up grain to grain, trim, measure (marking on grain at neck), and brush by hand with a stiff brush. Ooze leather should be put up grain to grain; and, in fact, from the time it is colored it should be handled in that manner and kept as free from wrinkles as possible.

Ooze leathers give the tanner a good outlet for poor grained small skins and L weights, and, with the exception of the blacks, are cheap to manufacture but require eternal vigilance and strict adherence to process.

# Cotton Softeners

**Classes of Softeners—Preparation of Softeners with Stearic Acid as Base—Soluble Oil Base Softeners, or Finishing Oils—Sulphated Softeners—Recipes**

**By P. F. ESTEY**

*Bradford Dyers' Association, Bradford, R. I.*

COTTON softeners may be divided into three general classes: First, softeners with stearic acid as a base; second, those with a soluble oil base; and, third, the sulphated oils. A softener may belong to any one or all three of these classes. Let us first consider those containing stearic acid as a base.

This class may contain a liberal amount of a good vegetable oil, such as cocoanut, castor or palm oil; an animal fat, such as tallow; a fair percentage of a non-saponifiable oil or wax, as paraffin wax, together with stearic acid. This mixture is quite effective as a softener, providing a good grade of oil is used. Castor, cocoanut and tallow are particularly well adapted for this type. Experiments with carnauba and some of the other higher melting waxes have not proved of particular value to the textile trade. Castor and tallow give a fuller hand than an equal amount of cocoanut oil. When the softener is used on white piece goods, paraffin wax may be found to be an advantageous addition. If the degree of softening to be done is slight, a product made of stearic acid and alkali alone is sufficient. The stearic acid is often replaced by oleic acid.

### Preparing Stearic Acid Base Softeners

The softener is made as follows: Melt together the waxes, oils and stearic acid, stirring constantly. In another receptacle heat the required amount of alkali and water to the boil. Then pour the melted fats into the boiling lye. Boil a few minutes while stirring constantly, and then allow to cool. The alkali unites readily with the stearic acid, and then with the vegetable oil. The amount of alkali added should not exceed the quantity necessary to unite with a portion only of the fat, as the uncombined fatty matter is the most important factor for softening and readily emulsifies with the soap formed from the alkali and combined fat.

Recipes for softeners of this type are as follows:

*Ammonium Stearate—*

1.0 pound stearic acid.
0.4 pound 25 per cent ammonia.

Dilute the ammonia with 1 quart of water. Heat to 160 deg. Fahr., and then add the melted stearic acid. Stir well.

*Castor-Paraffin Softener—*

49 grams paraffin wax.
81 grams castor oil.
78 grams stearic acid.
20 c.c. caustic soda at 75 deg. Tw.
600 c.c. water.

Heat the wax, oil and acid together until melted, and then add to the boiling caustic and water.

*Tallow and Cocoanut with Oleic Acid—*

1,275 grams good grade oleic acid.
1,000 grams tallow.
618 grams cocoanut oil.
116 c.c. caustic soda at 68 deg. Tw.
5 liters water.

Proceed as for castor-paraffin softener.

### Soluble Oil Base Softeners

The second class of softeners, those formed with a soluble oil base, are usually placed on the market under the name of finishing oils. Many of these are vegetable oils emulsified by soluble oil with a small amount of alkali. They are likely to contain a liberal amount of mineral oil, varying from a light mineral oil to a heavy cylinder oil. This type is used in conjunction with a good tallow softener and soluble oil. It gives a slippery, oily feel to the surface of the cloth without adding much weight or bottom feel. Such a softener may be made as follows: Boil 100 gallons of a good grade of castor soluble oil with 25 gallons of light colored mineral oil. Boil slowly for one hour, stirring with a mechanical agitator. Turn off the steam and allow to cool overnight, agitating all the while.

A very heavy finishing oil may be made as follows:

5,000 c.c. soluble castor oil.
480 c.c. light mineral oil.
300 c.c. cylinder oil.
290 grams tallow.
300 grams vaseline.
175 c.c. caustic soda at 72 deg. Tw.
2,000 c.c. water.

Melt the oils in the soluble oil and water, boiling for one hour. Add the alkali, boil an hour, allow to cool down, stirring all the while.

### Sulphated Softeners

The two important softeners in the sulphated class are soluble castor oil and sulphated tallow. They are made in practically the same way.

The tallow softener is compounded as follows: Six hundred cubic centimeters of pure acidless tallow are treated with 50 c.c. concentrated sulphuric acid. The latter is added very slowly, and great care must be taken not to allow the temperature of the mixture to rise perceptibly over the melting point of the tallow, in order that the tallow may not become charred. The mixture is allowed to stand for three days, and is then washed with an equal volume of water. After stirring, the oil soon comes to the top and the water and acid settle to the bottom of the vat. The layer of acid and water is syphoned off and the washing repeated twice with a saturated solution of Glauber salt. By this time all of the uncombined acid will have been removed from the tallow. The oil is then treated with a solution of 10 grams of caustic soda dissolved in 500 c.c. of water, which is sufficient alkali to unite with part of the sulphated oil. The product will form an excellent emulsion with water.

# The Preparation of Woolens for Red Dyeing

**Care Necessary in Wet Finishing Department—Tallow Soaps a Handicap—Use of Soaping Machine Necessary for Best Fulling—Pieces Should Not Be Run Rolled Up—Manipulation in the Washer—Carbonization with Aluminum Chloride Eliminates All Resist**

By CHARLES A. EVERETT

*Instructor, Lowell Textile School*

IN piece dyeing of woolens the preparation in the wet finishing department is very important. It has been proved beyond doubt that the use of tallow soaps is a serious handicap. Red oil soaps are not much better. Palm oil soaps are very good in some cases, especially potash palm oil soaps. Some finishers have made a very serious mistake by adding soda ash to potash soaps. These soaps should be made with potassium carbonate, pearl ash or ammonium carbonate. Recently the tendency has been to get rid of such soaps and use oil solvents. The latter usually come in the form of a thick liquid. The preparation of the fulling soap from these solvents differs somewhat from that of the solid soaps. Instead of boiling the soap for a few hours and then adding the alkali the alkali is dissolved in about one-third of a tank of boiling water; the steam is shut off and the oil is added, stirring vigorously while the tank is being filled with cold water. A good formula for such a soap is eight ounces of oil and four ounces of alkali per gallon.

### Avoidance of Uneven Fulling

Too much cannot be said regarding the benefits derived from the use of the soaping machine, especially for pieces that run only a short time in the fulling mill. Fulling is the *uniform* shrinkage of cloth caused by heat, pressure and moisture. If the pieces are unevenly soaped they will be fulled unevenly. In most cases pieces should be run in the fulling mills with all the doors open, including the back door. They should be tried frequently to see if they carry sufficient soap. Too much soap is just as injurious as too little, as it causes the pieces to slip, producing mill cracks. Under no circumstances should pieces be allowed to run rolled up, as it is apt to produce goods that are shaded side to center. Pieces that have this tendency should be tacked, and the tacking left in until just before the goods are to be carbonized. It must be borne in mind that if the fulling soap is not of the proper strength or consistency to start the grease, it probably will never be removed in the scouring. This can be determined when testing the pieces. If the soap shows watery instead of creamy on squeezing the pieces in the fulling mill, it shows that the soap has been overpowered and more should be added to start the grease.

### Manipulation in the Washer

After being put in the washer the goods should run in a lather made by adding a little hot water, which on handling gives a silky feel, for at least twenty minutes. After draining off the soap a continuous stream of water at 110 deg. Fahr. is applied for a few minutes, when the temperature is raised to 120 deg. Fahr. This temperature is maintained until a test with phenolphthalein shows no red or pink on the cloth. Cold water is then applied until the pieces are cold. The test solution of phenolphthalein is made up 120 grains in one quart of wood or denatured alcohol. The goods are then ready to be carbonized.

### Carbonizing

The more improved method of carbonizing consists of running the pieces open width through the pickle tank, then over a vacuum extractor and into the dryer and baker. This requires the pieces to be sewn together with silk thread. The vacuum tube should be made of glass in order to prevent corrosion. If, however, an extractor is used it should have a rubber or lead lined basket to prevent resist formation if sulphuric acid is used to carbonize. Chloride of aluminum is more expensive but it gives the pieces a loftier handle than sulphuric acid and positively eliminates resist. The dryer should be kept at as low a temperature as possible, and yet thoroughly dry the pieces. It also should have ample ventilation. The baker should never be allowed to get cooler than 220 deg. Fahr. After baking, the pieces should be run for ten or fifteen minutes each in a dry fulling mill with brass rolls to crush the blackened burs and knock them out.

Before dyeing, the pieces should be neutralized. If carbonized with chloride of aluminum they should be boiled up with just enough muriatic acid to throw them onto the acid side as shown by testing with blue litmus paper. If sulphuric acid is used to carbonize, the pieces should be neutralized with a little ammonia at a boil. The pieces are then ready to be colored.

# Mechanical Appliances for Pumping Chemical Solutions

## Part I

**Transportation of Solutions — Applications of Chemical Pumps — Materials Used in Construction — The Syphon and Its Applications—Various Arrangements of Syphon Installations**

**By A. K. FISCHER**

*President, Schutte & Koerting Company, Philadelphia, Pa.*

IN a large number of industries, the manufacturing operations involve the handling of raw materials, such as ammonia, liquor, benzol, coal tar, sulphuric acid, etc., which when received must be pumped from tank cars into storage tanks. The chemical reactions that are subsequently carried out in the various processes demand that solutions must be transported several times from one part of the plant to another, or elevated to the tops of towers through which the solutions percolate during the reaction processes. Finish products, such as acids, alcohols, benzol, many oils, toluol, etc., when ready to be shipped, must be pumped from storage tanks into the tank cars.

For all of these purposes see *Table I* on next page. Pumping appliances are required that withstand the corrosive and destructive action of the chemical liquids and at the same time are reliable in operation. The object of this paper is to describe and illustrate devices that have been developed for this work, and to show typical applications.

The principal means of moving chemical liquids can be classified as follows:

TABLE II

Chemical Pumps

| *Mechanical Appliances* | *Motive Power* |
|---|---|
| A. Jet Apparatus— | |
| 1. Syphon or steam jet pump. | Steam jet. |
| 2. Air jet lift..... | Compressed air. |
| B. Vacuum Lift ..... | Steam jet. |
| | Air jet. |
| C. Pneumatic Displacement Pump (blow case, acid egg, montejus) ..... | Compressed air. |
| D. Diaphragm Pump ..... | Pulley drive. |
| E. Rotary Pump— | |
| 1. Gear pump ..... | Pulley or motor drive. |
| 2. Centrifugal pump ..... | Pulley or motor drive. |

These appliances are made of iron, bronze, lead, hard rubber, porcelain, stoneware, monel, illium and other materials (see *Table III*) that resist the corrosive or destructive action of the liquids handled. The iron mentioned is an acid proof cast iron that is free from sulphur. Enamel is sometimes used as a coating.

TABLE III

Materials of Which Pumps Are Made for Handling Chemical Liquids

| | |
|---|---|
| Acetic acid, concentrated ..... | Bronze. |
| Acetic acid, diluted ..... | Bronze. |
| Acid mine water ..... | Bronze. |
| Alkaline water ..... | Iron. |
| Alcohol, crude ..... | Bronze. |
| Alum liquors ..... | Lead. |
| Aluminum sulphate ..... | Lead. |
| Ammonia water, aqua ammonia ..... | Iron. |
| Anilin water ..... | Iron. |
| Benzene ..... | Iron. |
| Benzine ..... | Bronze. |
| Bisulphite liquors, all percentages..... | Lead. |

TABLE I

TYPICAL APPLICATIONS OF CHEMICAL PUMPS

| *Kind of Plant* | *Application* |
|---|---|
| Explosive and powder plants | Pumping acids. |
| Sulphuric acid plants | Circulating acids through Glover and Gay Lussac towers. |
| Fertilizer works | Conveying acids from storage tanks to mill mixers. |
| Chemical plants | Pumping acids and process liquids. |
| Steel works | Handling acids for pickling. |
| Benzol plants | Transferring acids from storage tanks to wash tanks. |
| Storage battery plants | Handling acids from forming tanks to restrengthening tanks. |
| Artificial silk mills | Transferring liquids used in the spinners. |
| Textile mills | Pumping mercerizing liquids. |
| Bleacheries | Pumping bleaching liquors. |
| Sugar refineries | Lifting milk of lime or sugar juice. |
| Vegetable oil works | Handling caustic alkalies and acids. |
| Crude oil refineries | Pumping acids and sludge. |
| Coke oven plants | Lifting ammonia water. |
| Gas works | Lifting tar. |
| Canneries | Lifting material to be canned. |
| Textile mills | Lifting dyes, colors and sizing. |
| Chemical works | Lifting molasses. |
| Soap works | Lifting oils and fats. |
| Dye works | Handling dyes from leaching wheels. |
| Distilleries | Lifting molasses. |

TABLE III, CONTINUED

| | | | |
|---|---|---|---|
| Bitter mineral water | Bronze. | Glycerin | Bronze. |
| Brine, calcium | Iron. | Iron Sulphate | Bronze. |
| Brine, sodium | Bronze. | Lime water | Iron. |
| Cane juice | Bronze. | Linseed oil | Bronze. |
| Carbonate of soda | Iron. | Lye, caustic | Iron. |
| Caustic carbonate of soda in solution, hot | Iron. | Molasses | Bronze. |
| Caustic chloride of magnesium solution, cold | Iron. | Naphtha | Iron. |
| Caustic chloride of magnesium solution, hot | Lead. | Nitric acid, concentrated | Stoneware. |
| Caustic cyanogen in solution | Iron. | Paraffin, hot | Bronze. |
| Caustic maganese in solution | Iron. | Petroleum | Iron. |
| Caustic potash solution | Iron. | Petroleum ether | Iron. |
| Caustic potash niter in solution | Iron. | Phosphoric acid | Lead. |
| Caustic soda in solution | Iron. | Potash solution | Iron. |
| Caustic sodium chloride solution | Iron. | Purifying oil | Iron. |
| Caustic zinc chloride | Iron. | Rape oil | Bronze. |
| Chlorine | Stoneware. | Salt water | Bronze. |
| Chloride of potash solution | Iron. | Sebacic acid | Bronze. |
| Coal tar oil | Iron. | Soap water | Iron. |
| Copper cyanide | Bronze. | Soda | Iron. |
| Creosote oil | Iron. | Sodium chloride solution | Bronze. |
| Cresol | Iron. | Sodium sulphate | Iron. |
| Cyanogen | Bronze. | Sulphate of lime | Bronze. |
| Cyanide of potassium | Iron. | Strontia in caustic solution | Iron. |
| Ferrous chloride | Iron. | Sulphide of hydrogen | Bronze. |
| Gasoline | Bronze. | Sulphite of sodium, hot | Iron. |
| Guncotton brine | Iron. | Sulphuric acid, 45 or 50 deg. Be., hot | Lead. |
| Hydrochloric acid in thin solution | Bronze. | Sulphuric acid, 65 deg. Be., cold | Lead. |
| Hydrochloric acid | Stoneware. | Sulphuric acid, 65 deg. Be., hot | Iron. |
| Hydrochloric acid | Bronze. | Sulphurous acid, concentrated | Bronze. |
| Hydrochloric acid | Hard rubber. | Sulphurous acid, diluted | Lead. |
| | | Tannic acid | Bronze. |
| | | Tartaric acid | Stoneware. |

| | |
|---|---|
| Turpentine oil | Iron. |
| Vegetable oil | Iron. |
| Vinegar | Bronze. |
| Vitriol | Stoneware. |
| Wood alcohol | Bronze. |

Of the various devices for pumping chemical liquids, the steam jet pump, commonly known as the syphon, is the simplest. It is rugged in construction, easy to handle, low in first cost, reliable in operation, and in instances where a liquid must be both heated and elevated, the raising of the liquid may be considered an almost costless function.

The operation of the syphon is obvious from *Fig.* 1. Steam is admitted as shown, and discharged through the steam nozzle into the combining tube, evacuating the

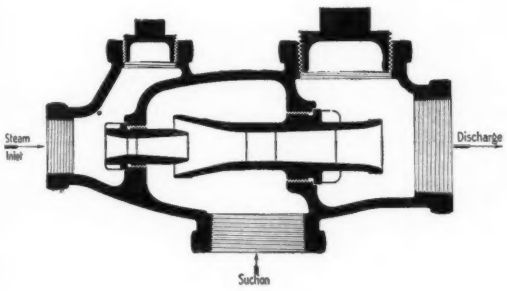



FIG. 1—*A Typical Syphon for Handling Chemical Solutions*

liquid supply or suction pipe, and causing the liquid therein to rise until it comes in contact with the steam. The steam emerges from the nozzle at high velocity, condenses on meeting the liquid, and imparts sufficient momentum to the liquid to discharge it through the outlet against the required elevation. As the liquid flows from the entrance of the combining tube to the throat, its velocity gradually increases until at the throat of the tube, the velocity is a maximum. At this point all of the steam has been condensed. From the throat to the exit, the tube diverges, and the velocity is transformed into pressure which is sufficient to force the liquid to the required elevation.

TABLE IV

SYPHON STEAM PRESSURES FOR DIFFERENT ELEVATIONS

| Total Elevation Ft. | Steam Pressure Lbs. per Sq. In. |
|---|---|
| 40 | 40 |
| 60 | 60 |
| 80 | 80 |
| 100 | 100 |

*Table IV* shows the steam pressures that are required for elevating liquids to different heights. In order to obtain the best results, the syphon should be suspended just above the surface of the liquid to be lifted—but the syphon may be either immersed in the liquid or suspended above the surface at a greater height within the limits of suction given in *Table V.*

TABLE V

LIMITS OF SYPHON SUCTION

| Steam Pressure Lbs. per Sq. In. | Steam Valve Opened Full | Limit of Suction in Ft. Steam Valve Cracked And Opening Closely Regulated |
|---|---|---|
| 20 | 18 | 18 |
| 40 | 18 | 20 |
| 60 | 15 | 24 |
| 80 | 12 | 24 |
| 100 | 9 | 24 |

If the total elevation to which the liquid must be pumped is not too high, syphons can be used even for 24 ft. suction when the steam is turned on full. For use in instances where the syphon can be immersed, or where the liquid flows to the syphon by gravity, special syphons are obtainable that will overcome total elevations twice those given in *Table IV,* and that will handle solutions at 120 deg. Fahr.

TABLE VI

SYPHON STEAM CONSUMPTION

| Elevation Ft. | Increase in Temperature— Deg. Fahr. | Ratio of Steam Consumed to Liquid Discharged |
|---|---|---|
| 20 | 15 | 1/84 |
| 40 | 20 | 1/65 |
| 60 | 24 | 1/58 |
| 80 | 28 | 1/48 |
| 100 | 32 | 1/42 |

The approximate ratio of steam consumed to liquid discharged and the correspondnig increase in the temperature of the liquid during the pumping operation are given in *Table VI.* The steam pressure required for elevating acids of different densities are given in *Table VII.*

TABLE VII

HEIGHTS TO WHICH LIQUID CAN BE RAISED WITH DIFFERENT SYPHON STEAM PRESSURES

| Steam | Density of Acid, Deg. Be. | | | | | |
|---|---|---|---|---|---|---|
| Press., Lbs. Per Sq. in. | 10 | 20 | 30 | 40 | 50 | 60 |
| | Height to Which Acid Can Be Raised | | | | | |
| 20 | 24 | 22 | 20 | 18 | 16 | 14 |
| 40 | 48 | 44 | 40 | 36 | 32 | 28 |
| 60 | 72 | 66 | 60 | 54 | 48 | 42 |
| 80 | 96 | 88 | 80 | 72 | 64 | 56 |

Syphons are frequently made of brass or iron, or with iron bodies and brass nozzles. For lifting substances

that have a destructive action upon iron or brass, syphons are made of lead, porcelain, stoneware or hard rubber. The accompanying table itemizes a few materials and the more common liquids for which they are employed:

TABLE VIII

MATERIALS OF WHICH SYPHONS ARE MADE FOR VARIOUS CHEMICALS

| *Liquid* | *Material of Which Syphon Is Made* |
|---|---|
| Sulphuric acid, weak and strong | Lead or stoneware. |
| Sulphuric acid | Lead. |
| Chlorite | Stoneware or porcelain. |
| Hydrochloric acid | Stoneware or porcelain. |
| Copper sulphate | Lead. |
| Caustic soda | Iron. |
| Tartaric acid | Stoneware or porcelain. |

In order to operate efficiently and to be reliable in service, syphons must be carefully designed and made of

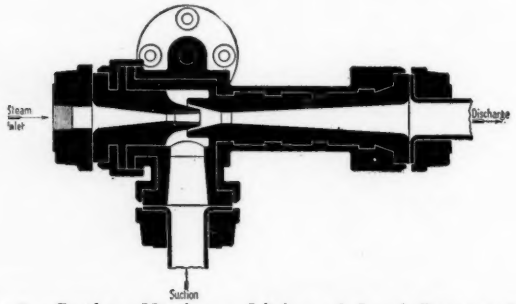



FIG. 2—*Syphon Having a Lining of Lead Protected by An Armor of Iron*

the proper materials. Ordinarily a material that resists effectively the corroding effect of the liquid is soft or brittle and liable to injury by abrasion or breakage.

The selection of the proper material, both to afford the necessary reliability of construction and at the same time to insure efficient operation, is of importance. High grade equipment should not be considered on the basis of of first cost alone. Because of the longer and more satisfactory service that such equipment insures, it is always less expensive than cheaper equipment of inferior grade.

A typical lead-lined acid-resisting syphon is shown in

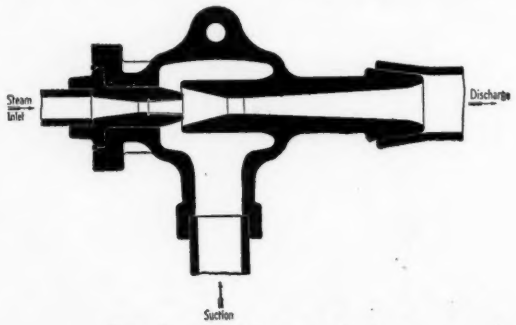



FIG. 3—*An All Lead Syphon*

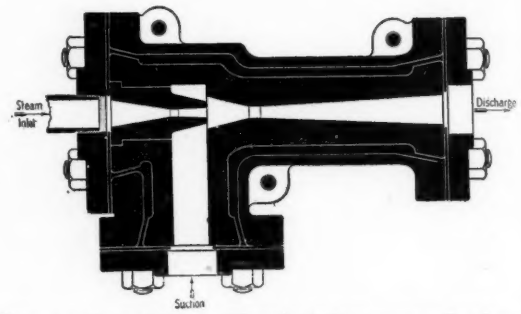



FIG. 4—*Porcelain or Chemical Stoneware Syphon*

*Fig.* 2 and consists essentially of a lead body having a lead steam nozzle protected by a platinum alloy lining. The body of the syphon is armored by a shell of iron so that the exact alignment of the syphon parts cannot be

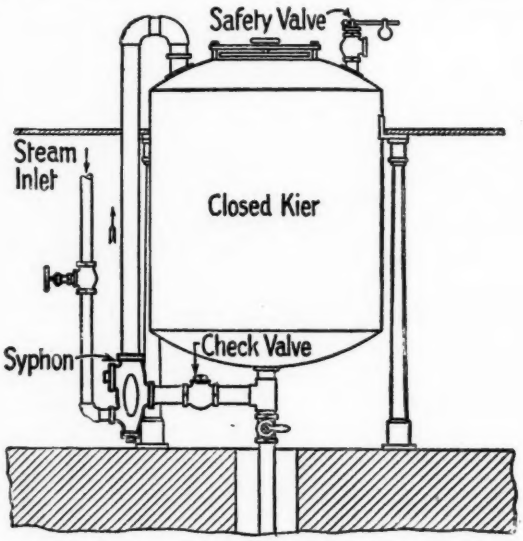



FIG. 5—*Syphon for Circulating the Lye Solution in a Closed Kier*

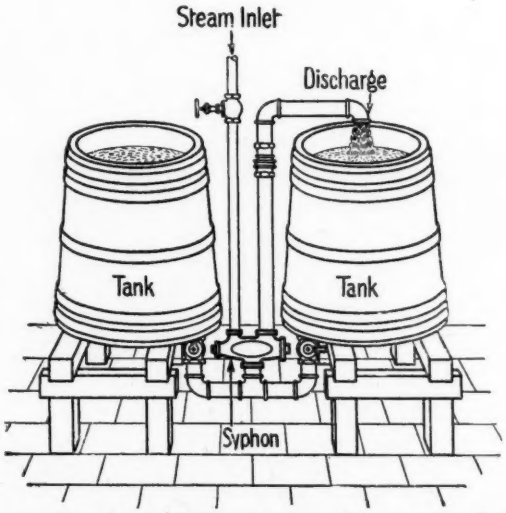



FIG. 6—*Tannic Acid Circulated by Means of a Syphon*

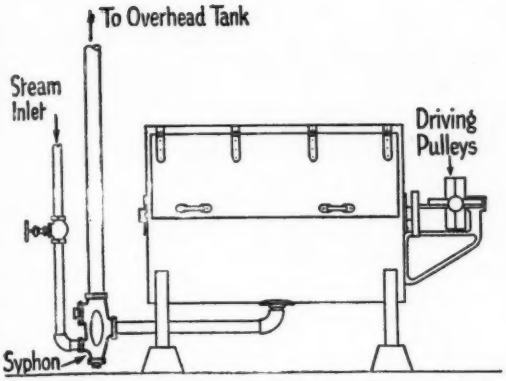



FIG. 7—*Syphon in Connection with a Chrome Drum or Paddle for Tanning Leather*

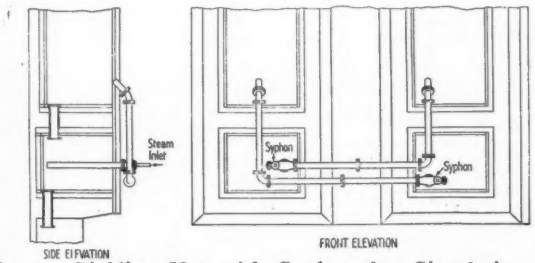



FIG. 8—*Pickling Vat with Syphon for Circulating the Acid Bath*

disturbed or the strength of the apparatus impaired. The iron shell is made with flanged connections for the external lead piping, the lead pipe being expanded and clinched between the flanges as shown in the figure, thus providing a connection that is easily made and as easily disconnected.

An all lead syphon is shown in *Fig.* 3. It has heavy body walls that afford adequate protection against breakage. The steam nozzle is made of a platinum alloy. The all lead syphon is used wherever the syphon must be entirely submerged in the liquid and subjected both on the inside and on the outside to corrosive chemical action. It is ordinarily attached to the pipe line either by hose nipples, or preferably by burning the pipe to the syphon.

Syphons made of porcelain or stoneware resist effectively the action of practically all chemicals—hence are well adapted for lifting all kinds of chemical liquids, but

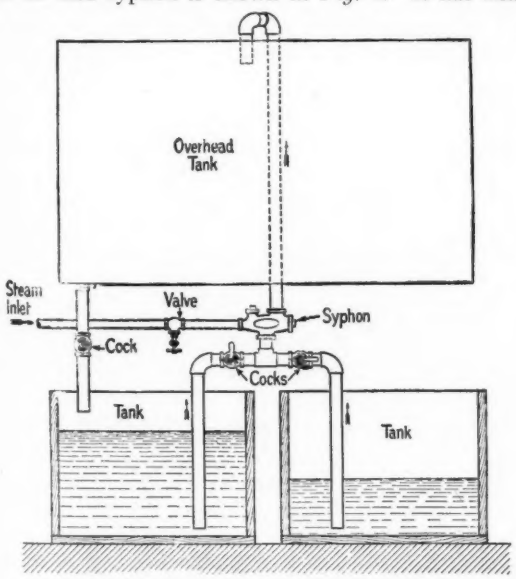



FIG. 9—*Syphon Application Showing How Liquid Can Be Raised Alternately from One Tank and Then from Another*

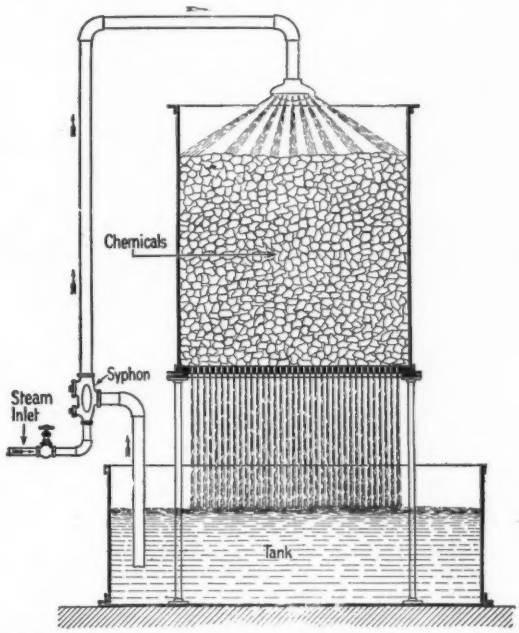



FIG. 10—*Syphon for Raising Liquid to Top of Tower*

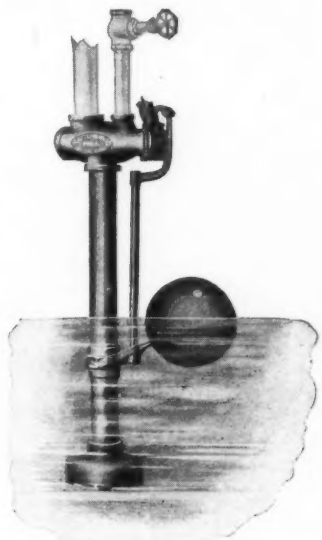


FIG. 11—*An Automatic Syphon Which Is Intermittently Put into Service by Means of a Snap Valve Actuated by a Ball Float*

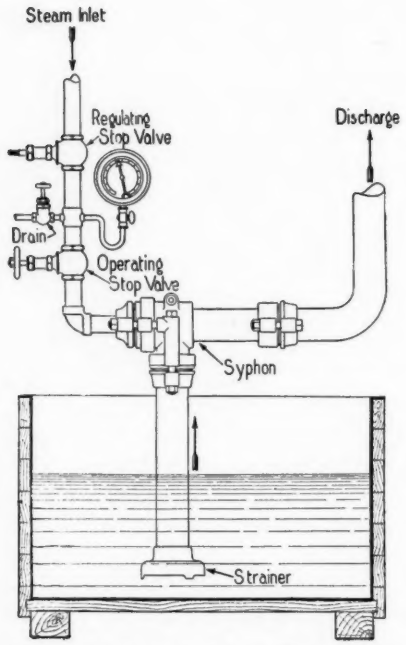



FIG. 12—*Method of Installing Syphon*

porcelain and stoneware are brittle materials that are readily broken by impact, careless handling, or by sudden changes in temperature. For this reason porcelain and stoneware syphons of modern construction are completely armored—see *Fig.* 4 for a typical construction.

Syphons are also made of hard rubber, aluminum and special alloys to meet special requirements.

*Fig.* 5 shows a typical syphon arrangement for circulating lye in a closed kier used in bleaching or washing. Here it is highly essential to cause the lye to circulate at a uniform speed and at the same time to keep the required temperature throughout the process as constant as possible.

*Figs.* 6, 7, 8, 9 *and* 10 show typical applications of syphons for (a) extracting tan bark, (b) emptying a chrome drum in the dyeing process, (c) circulating the acid in a pickling vat wherein iron or steel is treated with dilute acid in order to remove the iron oxide surface scale, (d) lifting a solution alternately from one tank and then from another and discharging the solution into an overhead tank from which it is subsequently removed as required, and (e) for elevating acid to the top of a reaction tower.

The syphon is admirably adapted to all these applications, inasmuch as it resists effectively the acid or corrosive action of the liquid solutions. It has no moving parts, consequently there is little wear or tear. It does not require engines, belting or gearing for driving or oiling or attendance of any sort. No foundations are necessary, as the piping provides ample support for the syphon.

Furthermore the syphon can be operated automatically —but in most instances automatic operation is limited to liquids that do not attack copper and that therefore permit the use of the ordinary copper ball float. Lead and stoneware are not suitable for this purpose.

A typical automatic syphon is illustrated in *Fig.* 11. As the liquid or chemical solution fills the pit to the upper level, it raises the copper ball float, thereby snapping open a steam inlet valve and putting the syphon into service. When subsequently the liquid is removed and the float sinks to the lower lever, the snap valve is closed, steam is shut off, and the syphon made inactive until the pit is again filled. It does not stick in an intermediate position, and under these conditions no steam is wasted.

In order to obtain the best results, syphons should be installed as shown in *Fig.* 12. The regulating stop valve is throttled and the steam pressure is reduced to a pressure at which the syphon operates most satisfactorily. The valve is then locked in this position. The operating stop valve is used for turning on and shutting off the steam.

Before the syphon is started up, the drain is opened in order to discharge the accumulated condensation. There should be no traps in the delivery pipe, and the suction pipe should be air tight.

(*Part II will follow in the next issue.*)

## DYEING WITH INDIGO

In spite of the new dyestuffs that have been brought out during the past ten years indigo vat dyes still hold the field, although not to the same extent as before the introduction of diazotized, sulphur, and the recently introduced vat dyestuffs. On examination there are found to be several reasons for the continued use of indigo. The bright blue tone, even in bright shades, remains unchanged after many hard washings with soap and soda, even at a boil. This is an advantage as compared with competing dyestuffs, with the exception of the vat dyes, which are brighter and more expensive and the Hydron Blue G and R and Hydron Blue Black, which are competing sharply with indigo on account of the simple method of dyeing them and the low prices at which they are sold. Furthermore, colors obtained with these dyestuffs retain the bright blue shade and are sometimes improved after being frequently washed and dried.

The users of colored goods that have become favorably known by reason of the fastness of the indigo blue with which they have been colored, are consequently conservative, and when the characteristic, sharply marked yellow spot is not obtained by the application of nitric acid, the goods are rejected. It is therefore a good plan for dyers to inform themselves regarding the preferences of the buyers. In addition to the nitric acid test indigo dyed goods are known by the scalelike appearance and the tendency to crock. The first named defect must be corrected and the last one reduced to a minimum.

It is very difficult to get a uniform shade of pearl blue in an indigo vat even when the yarn is subjected to two

or three dips. It is, however, possible by the following process to color in an indigo vat a pearl blue that is very uniform and which does not have the scalelike appearance that is characteristic of indigo. The yarn is well opened up and then boiled in water, preferably under pressure. The indigo in powdered form is reduced to a uniform pulpy mass, the soda solution is added, lastly concentrated hydrosulphite of soda, and the mixture then heated to 104 deg. Fahr.

0.3 lb. powdered indigo.
1.5 lb. soda solution 36 deg. Be.
0.9 lb. hydrosulphite.

After one-quarter to one-half hour the golden yellow mass is poured into a 132 gallon (1,100 pound) dye vat filled with water. If the water is hard it should be artificially softened. When the liquor at 77 deg. Fahr. is yellow, the yarn is worked for twenty to twenty-five minutes. It is then quickly unwound before oxidation results, spooled and dried. The old bath can be used again by adding one-half to three-fourths of the original quantity of the ingredients in order to get the same shade.

Cadet blue can be obtained in the same way with 0.5 pound of powdered indigo. With the zinc vat three dips are frequently required. A fast medium blue requires no more than two dips. It can be obtained in one dip in a dye liquor made as follows:

1.1 lb. powdered indigo.
3.3 lb. soda solution 40 deg. Be.
3.1 lb. hydrosulphite of soda.
1.1 lb. Turkey red oil.
4.4 lb. common salt.

The dyeing operation lasting for one-half hour. The material should not be turned too often, but must be extracted and unwound when the vat is not equipped with a good set of squeeze rolls, and is left to oxidize for one-quarter to one-half hour. The yarn is then rinsed and finished without neutralizing. Three dips are necessary in the zinc dust lime vat. The lime salts must then be removed, which is done with sulphuric acid. This method prevents the scalelike appearance. In order to obtain the same shade the second vat is prepared by adding one-fourth of the original quantity of indigo and one-half the amount of salt. The Turkey red oil makes the shade redder. The addition of a small amount of glue is an advantage, although not essential.—Leipziger Monatschrift fur Textile Industrie, through Textiles.

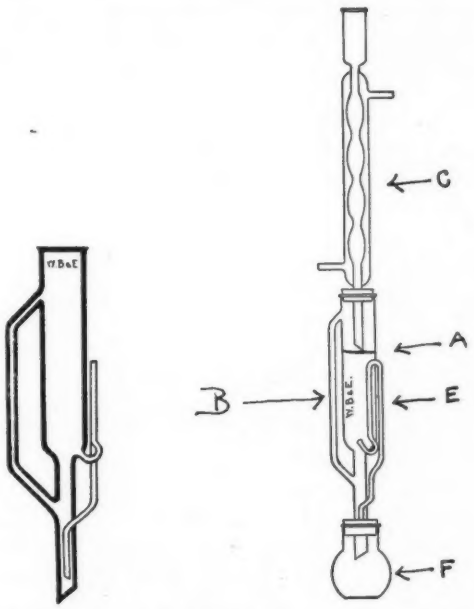
## Things Every Textile Chemist and Colorist Should Know

[*Note—Under this heading is introduced as a more or less regular feature the discussion of certain fundamentals which should be a part of every textile chemist's and colorist's working knowledge. It is hoped that such discussions will instruct some of the younger readers, and serve as a review for those of broader experience and knowledge.*]

### No. 8
### The Soxhlet Extractor

A SOXHLET extractor is a piece of chemical apparatus extensively used for extracting from various materials accompanying soluble substances, such for instance as the extraction of various oils from textile materials. Most any solvent can be used, although alcohol, ethyl ether or petroleum ether are perhaps more extensively employed than any others.

A Soxhlet extractor, represented by (E) in the accompanying cut, works on the syphon principle, and is commonly inserted between an extraction flask (F) which is below, and a Liebig condenser (C) which is above.




The material to be extracted, as for instance, a piece of cloth containing oil, is placed in the Soxhlet extractor and the solvent, which we will say in this case is petroleum ether, in the extraction flask. Inflammable solvents like petroleum ether should never be heated with a naked flame, but by means of a steam or water bath, or by some electric heater designed for that purpose. As soon as the extracting liquid begins to boil, its vapor rises through a by-pass (B) on the side of the Soxhlet extractor, as will be seen from the accompanying illustration, and is condensed in the condenser and slowly runs into the

chamber of the Soxhlet extractor where it comes into contact with the cloth. When the height of this condensed extract rises to a point just above the top of the syphon on the right hand side of the extractor, as indicated by A in the illustration, all of the solvent which has been in contact with the cloth for a few minutes and which has dissolved a certain amount of the oil syphons back very quickly into the extraction flask at the bottom, and is ready to be redistilled and go through the same process again. The dissolved oil, being non-volatile at the temperature at which the solvent volatilizes, of course, remains behind in the extraction flask and gradually accumulates. When an extractor is working properly there will be complete circulation of the extraction liquid every few minutes. This process is continued until it is believed all of the oil, or whatever the substance may be, has been extracted from the material in the extractor. It is then a simple matter to reclaim the solvent if desired by distilling it from the extraction flask through another condenser. If the extraction flask is carefully weighed before the operation begins and is again carefully weighed at the end of the operation after the solvent has been completely distilled off, the difference will ordinarily be the weight of the oil extracted from the cloth.

This apparatus can be used for a variety of purposes. Frequently results are desired just the opposite of those described above, namely, the removal of some soluble substances for the purpose of determining the residue rather than extracted matter. As an illustration, we might take a given amount, say, five grams, of raw wool in the grease and place it in a Soxhlet extractor. After circulating naphtha or petroleum ether through this wool for a period of half an hour to an hour, we should have completely removed the wool grease. Water could then be circulated through the apparatus for another hour more or less, whereupon the suint and soluble potash salts would be removed. The residual wool, if taken from the Soxhlet extractor and carefully weighed, would represent the perfectly clean wool, plus any mechanical material such as burs, straws, etc., which might have been present. This sample of wool, if necessary, could then be subjected in the laboratory to the carbonization process and upon careful mechanical agitation practically all of the mechanical impurities would be removed. If this residual wool was found to weigh two and a half grams under the same conditions of humidity as those under which the original sample was weighed you would have quite accurately determined that 50 per cent of the raw wool was actual wool fiber. Incidentally it would have been possible to have retained the wool grease and suint in separate flasks and determined them quite accurately.

Special extraction thimbles or shells are made of heavy filter paper into which material to be extacted may be inserted and the thimble and its contents placed in the extractor. If the top of the thimble comes just above the top of the syphon at the side, there is no danger of any insoluble matter in suspension being carried down mechanically into the extraction flask as the extract syphons over.

---

## 1923 SPRING SEASON COLOR CARD, OUT NOVEMBER 6. WILL SHOW 80 SHADES

The Textile Color Card Association of the United States, Inc., is just releasing to its members the 1923 Spring Season Color Card of America, forecasting the colors fashion will employ during the coming spring and summer seasons.

As this card is so important a factor in the determining of fashionable hues, it is awaited with interest by all branches of industries in which color plays a part. The new card portrays 80 colors, 66 of which are shown in silk and 14 in worsted fabrics. In a separate group are 10 shoe, leather and hosiery shades.

Many beautiful tints and shades of the chromatic scale are shown and, while there are some vivid splashes of brilliant hues, the colors in general possess a softness and clarity of tone most pleasing in effect.

Among the several innovations are especially noticeable the Strawberry, Crushed Berry and Dulcet Greens. These are the sumptuous color harmonies which Persia has called her very own for centuries. Among these are Persian Pink and a deep strawberry shade called Rubaiyat. Cool grayish greens appear in two ranges, one showing Pistache and Eucalyptus tones, the other Almond Green and blue Spruce.

Regal blues of Egyptian persuasion are Cleopatra, Rameses and Pharaoh. These blend in classic harmony with the deep golden orange of Oriole and Eldorado. The Venetian influence is also sensed by luxurious rose shades and light emerald greens, notable among which is Harlequin. Other greens, more yellow in tone, are aptly named Meadow, Grass and Cress.

Orchid and violet shades are also featured prominently. Clover and Ophelia of pink cast, are decidedly novel. Daybreak and Viola are blue in tone, while Fireweed is a rich reddish purple.

New smart woody browns are Cork, Sandalwood and Oakwood. Golden harvest browns, creamy tans, new sand shades and Ceramic blues are also offered. Unusual deep coral reds are called Fiesta, Confetti and Mephisto.

Cinder, Zinc and Pelican grays have been recalled, also Sulphur and Citrine yellows.

There are some novel shades of sand and light browns among the woolen group, called Sirocco, Pampas and Pueblo. Two grays are named Granite and Traprock. A smart yellowish tan is called Calabash. Of special interest are the new shades of red and green suggestive of Moorish coloring—these are Alcazar and Alhambra. A pleasing rose shade and a grayish Persian Green, also a soft violet named Delmonte, comprise the colors of the

(*Concluded on page* 313.)

# Proceedings of the American Association of Textile Chemists and Colorists


## The American Association of Textile Chemists and Colorists

*President*
LOUIS A. OLNEY
Lowell Textile School, Lowell, Mass.

*Vice-Presidents*
WILLIAM D. LIVERMORE WILLIAM H. CADY

*Secretary*
WALTER E. HADLEY
5 Mountain Avenue, Maplewood, N. J.

*Treasurer*
WINTHROP C. DURFEE
516 Atlantic Avenue, Boston, Mass

*Councilors*
ELMER C. BERTOLET GEORGE A. MORAN
ARTHUR E. HIRST WILLIAM K. ROBBINS
WALTER M. SCOTT


### EIGHTH RESEARCH COMMITTEE MEETING

The eighth meeting of the Research Committee of the American Association of Textile Chemists and Colorists was held at the Engineers' Club, Boston, Mass., Friday afternoon, October 13, 1922.

The following members were in attendance: L. A. Olney, William D. Livermore, William H. Cady, Winthrop C. Durfee, George A. Moran, William K. Robbins, W. M. Scott, W. J. Murray, William R. Moorhouse, A. D. Nute, W. E. Hadley and P. J. Wood.

Letters of regret were read from A. E. Hirst and Ed. F. L. Lotte, who were unable to be present.

A special committee was appointed at the June meeting to consider the Fastness of Dyed Materials to Light, of which William H. Cady was Chairman. This committee reported progress, but owing to the wide scope of the subject requested that the preliminary report be deferred until the next meeting of the Research Committee.

The special committee named at the June meeting for the consideration of Fastness to Bleaching, of which A. E. Hirst is Chairman, showed considerable preliminary work had already been done, and a further report will be forthcoming at the next meeting of the Research Committee. The personnel of this special committee was materially strengthened by the appointment of William K. Robbins.

As further work for the Research Committee, it was determined that the Fastness to Stoving, Crocking, Perspiration, Ironing, Carbonizing, etc., would be thoroughly dealt with.

The meeting then adjourned.

Respectfully submitted,

W. E. HADLEY, Secretary.

### RHODE ISLAND SECTION MEETING

The following notice of the first fall meeting of the Rhode Island Section was mailed to members by Chairman Cady about October 10. Owing to the meeting being held after this issue of the Proceedings had gone to press, a full report thereof will have to be postponed until the next issue.

The notice follows:

"The fourth meeting of the Rhode Island Section will be held at the rooms of the Providence Engineering Society, 29 Waterman Street, on Friday, October 20, at 8 p. m.

"Frederick J. Hoxie will speak on 'The Use of the Microscope in the Textile Industry,' and will illustrate his talk with lantern slides. Mr. Hoxie has been engaged in research work along this line for many years, and is particularly well qualified to speak. Members who have had experience with the microscope in textile work are especially requested to be present and contribute to the discussion.

"A special election of officers will be held to fill two vacancies caused by removal from the Section, and the plan of affiliation with the Engineering Society, the details of which were worked out during the summer, will be discussed.

"WILLIAM H. CADY, Chairman."

### NOMINATING BALLOTS AND QUESTIONNAIRES MAILED TO MEMBERS

In accordance with resolutions adopted by the Council, the Secretary recently mailed to all members of the Association a ballot for the nomination of officers for 1923 to be elected at the annual meeting on December 2 and a questionnaire regarding activities at the meeting.

The letter from the Secretary accompanying these papers, the questionnaire and ballot themselves are reprinted herewith. In case any member failed to receive his set by mail it is requested that he fill in the forms provided herewith and return them at once to

the Secretary. It is particularly requested that members give serious consideration to the question of presenting suitable papers at the annual meeting. The dissemination of information and the mutual exchange of viewpoints in this manner are among the most valuable services which members can render to each other and, in the aggregate, constitute one of the most important functions of the Association.

The documents in question follow:

To Members of the American Association of Textile Chemists and Colorists:

In accordance with Article VIII of the Constitution, you are hereby notified that at the coming Annual Meeting, to be held in December, it will be necessary to elect a President, two Vice-Presidents, a Secretary and a Treasurer, as well as two Councillors.

You are therefore directed to name your choice for the above officers for the coming year, on the blank ballot, returning same in enclosed stamped envelope, at your earliest convenience. The accompanying ballot must be signed and returned not later than October 28, 1922, in order to be valid.

The present incumbents of the above offices are: Louis A. Olney, President; William D. Livermore, Vice-President; William H. Cady, Vice-President; Walter E. Hadley, Secretary; Winthrop C. Durfee, Treasurer.

Councillors for one year were: Walter M. Scott and James L. Amsden (deceased).

In accordance with the Constitution, the above officers are all eligible for re-election.

Enclosed you will find questionnaire in regard to the coming Annual Meeting. Please fill out same and return with your ballot, in the enclosed stamped envelope.

Respectfully submitted,
W. E. HADLEY, Secretary.

QUESTIONNAIRE

1. Do you intend to be present at the Annual Meeting which is to be held in New York City, Saturday, December 2, 1922?

   .....

2. Will you present a paper upon some subject relating to Textile Chemistry, Dyeing, Bleaching or Finishing?

   .....

3. If you will present a paper, give subject and approximate time required to present same.

   .....

4. Please mention any subjects which you would be interested in having discussed at this meeting, or which might be made the subject of a general symposium of a Sectional meeting.

   .....

   .....

Please return in accompanying stamped envelope together with Nomination Ballot.

Respectfully submitted,
W. E. HADLEY, Secretary.

BALLOT
For Nomination of Officers for 1923

President .....

Vice-President .....

Vice-President .....

Secretary .....

Treasurer .....

Councillor for Three Years.....

Councillor for Three Years.....

Signed .....

Date .....

## NINTH COUNCIL MEETING

The ninth council meeting of the American Association of Textile Chemists and Colorists was held at the Engineers' Club, Boston, Mass., on Friday, October 13, 1922.

The following members were in attendance: L. A. Olney, William D. Livemore, William H. Cady, Winthrop C. Durfee, George A. Moran, William K. Robbins, W. M. Scott, P. J. Wood and W. E. Hadley.

A. E. Hirst, who was unable to be present, was represented by A. D. Nute.

The following members were admitted into the Association by vote of the Council:

*Active Membership*

Baird, William D., 56 West Seventeenth Street, New York City.
Textile Chemist, American Aniline Products, Inc.

Battye, H. G., 12 Galley Avenue, Toronto, Ont.
Research Chemist, Toronto Carpet Manufacturing Company, Ltd.

Baxter, John J., 10 Pearl Street, Careyville, Mass.
Textile Colorist and Dyer, Taft Woolen Company.

Clapham, Harry, Passaic Worsted Spinning Company, Passaic, N. J.
Boss Dyer.

Dearing, M. C., Griswoldville, Mass.
Superintendent of Finishing, Griswoldville Manufacturing Company.

Higginbottom, Harold J., 5927 Grand Avenue, West Duluth, Minn.
Dyer, Klearflax Linen Rug Company.

Jones, Charles H., 66 Park Avenue, Bloomfield, N. J.
Chemist, Beattie Manufacturing Company.

Mathewson, E. P., P. O. Box 124, North Barrington, R. I.
Dyer, Cranston Worsted Mill, Bristol, R. I.

Roos, Louis J., 1409 Amsterdam Avenue, New York City.
Colorist, Du Pont Company.

Sittig, A. E., 15 Treacey Avenue, Newark, N. J.
Textile Colorist, Amalgamated Dyestuff & Chemical Company.

Sutcliffe, George W., Box 93, Wareham, Mass.
Chemist and Dyer, New Bedford & Agawam Finishing Company.

Spurr, Charles, 1479 Central Street, Stoughton, Mass.
Chemist and Dyer, Imperial Dyewood Corp.

Tebbetts, John C., 66 University Place, New York City.
Chemist, American Aniline Products, Inc.

Gaede, Robert H., Gaede Silk Dyeing Company, P. O. Box 2033, Paterson, N. J.
Gaede Silk Dyeing Company.

*Junior Membership*

Darbey, Albert, Box 11, Greystone, R. I.
Textile Chemist and Colorist, Esmond Mills.

Derby, Roland E., 148 First Street, Lowell, Mass.
Student, Lowell Textile School.

Dogin, Louis J., 579 Putnam Avenue, Brooklyn, N. Y.
Colorist, H. A. Metz Company, Inc.

Innes, Archie K., P. O. Box 123, Franklin, N. H.
Dyer, Franklin Mills.

Perlmuter, B. H., 30 Mallon Road, Dorchester, Mass.
Student, Lowell Textile School.

Reed, Francis P., 27 Walker Avenue, Saylesville, R. I.
Finisher, Sayles Finishing Plants.

Roun, Carl D., East Greenwich, R. I.
Chemist, Apponaug Company.

Selya, Hyman P., 176 Purchase Street, Boston, Mass.
Chemist, F. E. Atteaux & Co.

Young, F. L., 25 Appleton Street, Atlantic, Mass.
Color Chemist, I. Levinstein & Co.

The President appointed E. H. Killheffer as a member of the Research Committee.

A discussion was held as to what procedure should be followed relative to the Annual Meeting which is to be held the early part of December. It was believed that the best interests of the Association would be served by having an afternoon session, at which the business could be transacted. This section of the meeting would then be followed by a dinner at which speakers of note would present subjects of universal and timely interest to all. It was voted to take up the consideration of the Provisional Methods of Fastness Tests, at the Annual Meeting.

In accordance with Article VIII of the Constitution, the Secretary was directed to send out blank ballots for nomination of officers for the coming year.

The Council meeting then adjourned, subject to the call of the President.

Respectfully submitted,
W. E. Hadley, Secretary.

## NEW YORK SECTION MEETING

The first fall meeting of the New York Section of the A. A. T. C. C. was held at the Hotel Pennsylvania Friday evening, October 20. Chairman P. J. Wood presided, with E. H. Killheffer acting as Secretary pro tem. About thirty-five members were in attendance.

Chairman Wood, after opening the meeting, spoke of the loss sustained by the Section since its last meeting in the sudden death of its Secretary, E. G. Quin. In accord with a motion unanimously carried, the Chairman appointed a committee, consisting of C. H. Jones, W. E. Mitchell and S. F. Carter, to draft suitable resolutions regarding Mr. Quin's death and report back to the meeting. The resolutions as subsequently presented and adopted appear elsewhere herein.

The election of a Secretary to succeed Mr. Quin was next in order. Messrs. Giles Low and L. C. Lewis were nominated, and after a written ballot it was announced that Mr. Lewis had been elected by a close vote. Mr. Lewis thereupon took up his duties as Secretary to the meeting.

The chairman reported that at the last Council meeting the question of holding the annual meeting of the Association in New York on December 2 had been discussed and approved. Upon motion duly made and seconded the Secretary was instructed to extend to the Council a formal invitation to hold the annual meeting under the auspices of the New York Section on the date mentioned.

The Chairman announced that he would appoint a Reception Committee and an Arrangements Committee to take charge of matters relative to the annual meeting, and would announce the personnel of these committees in the near future. The committees as

subsequently appointed were: Reception Committee —The Executive Committee of the Section, consisting of the Chairman and the Secretary; Arrangements Committee—E. H. Killheffer, W. E. Mitchell, C. A. Mace and L. C. Lewis.

A discussion of the ballots and questionnaires recently mailed by the Secretary to all members was next taken up. It was pointed out that all of the retiring officers of the Association were eligible for re-election and it was the consensus of opinion of the meeting that these officers should be so re-elected. In regard to the election of two councillors to serve for three years, it was pointed out that Dr. Scott, who has become affiliated with the New York Section, was eligible for re-election, and it was the sense of the meeting that he be so nominated. It was suggested that, in order to obtain some uniformity of action, some one member of the New York Section be named to fill the remaining vacancy on the council. Upon motion duly made and seconded E. H. Killheffer was nominated for this office.

The Chairman announced that the Cooper Hewitt Electric Company had offered to make a demonstration of its lamps before the Section and to provide a technical man who would be able to answer all questions relative to the testing of dyed samples for fastness to light by this apparatus, and suggested that this offer be accepted for some future meeting of the Section. Mr. Wilmot offered his laboratory and office in Brooklyn as a meeting place when this demonstration should take place, saying that he had installed there a Fade-o-meter which might be interesting and useful in supplementing the demonstration of the Cooper Hewitt equipment. It was the sense of the meeting that this offer should be accepted.

Mr. Killheffer spoke of the work which has been done by the Research Committee in preparing preliminary tests for fastness to washing of various fabrics, and suggested, inasmuch as these tests were to be considered at the annual meeting by the whole body, that it would be to the advantage of the members if they could be discussed by the New York Section prior to this meeting, to the end that members might be better informed when the discussion before the entire body took place. A great deal of discussion regarding the general questions of fastness to light and washing took place, at the conclusion of which it was moved and carried that the next meeting of the Section be devoted to a discussion of the preliminary tests already published, and members were requested to study these tests so as to be in a position to offer suggestions at the next meeting.

Mr. Killheffer suggested, and Mr. Hadley put in the form of a motion, that representatives of the National Council of Dyes and Colors, a body to which early investigation undertaken by the United Waist League had been turned over, be invited to be present at and participate in the discussion of the tests for fastness at the next meeting. This motion occasioned considerable discussion. Mr. Herrmann said that he felt that the presence of laymen representing the consuming industries would tend to confuse the technical discussion of the tests in question, and that while he approved of this body having an opportunity to cooperate with the Association before the tests were adopted as standard, he felt that their presence at a preliminary discussion would be harmful. Chairman Wood indorsed this sentiment, saying that he believed the presence of outsiders would lead to digressions from the business in hand and that it would be impossible to complete a consideration of the tests themselves from a technical standpoint if layman consumers were participating therein. Mr. Hadley's motion, when put to a vote, was lost.

Chairman Wood asked if any of the members present had technical problems which they wished to bring before the meeting in the hope of securing helpful advice. There being no response from the floor, Mr. Wood said that he had had trouble in printing bronze and aluminum powders on silk draperies, in that he had been unable to find a vehicle which would cause the powders to adhere with sufficient tenacity without making the fabric stiff and unpliable. This precipitated a discussion of considerable length, several suggestions being made by various members, but no process was brought out which could be vouched for as thoroughly satisfactory in actual use.

It was agreed that the next meeting of the Section should be held Friday evening, November 17, in the same room at the Hotel Pennsylvania, and the meeting thereupon adjourned.

L. C. Lewis, Secretary.

## IN MEMORIAM E. G. QUIN

At the meeting of the New York Section of the American Association of Textile Chemists and Colorists held October 20, 1922, the following resolution was adopted:

"Resolved, That the meeting desires to express its sorrow at the death of its Secretary, E. G. Quin, and its appreciation of his interest in the Association, together with its sympathy for Mrs. Quin in her sad bereavement, and that a copy of this resolution be forwarded to Mrs. Quin and to John Campbell & Co."

C. H. Jones,
W. E. Mitchell,
S. F. Carter,
Committee.

## 1923 SPRING SEASON COLOR CARD, OUT NOVEMBER 6, WILL SHOW 80 SHADES

(*Concluded from page* 308.)

sport type. A light blue of exotic temperament is dubbed Indo and one of deeper tone Tunis.

Very light Pebble, Beige and rich browns including Mandalay and Hindu, are the outstanding notes sounded in the shoe and leather group. A new golden brown is called Briar. Three grays are given—Silver, Fog and a deeper shade called Cruiser. The popular Otter is again included.

The card will be released for general distribution to the trade about November 6.

# Notes on the Dyeing of Direct Blacks on Cotton Piece Goods

### Part III – Concluded from Last Issue

**Difficulties in Dyeing Grays — A Continuous Dyeing Plant for Grays — Construction, Operation and Advantages—Construction and Operati on of Plant Making Rinse Unnecessary —Plant for Dyeing Very Light Shades**

By RAFFAELE SANSONE

### Avoiding Rinsing After Dyeing

With many grays dyed with direct blacks without the addition of salt, there is no doubt that the rinsing process could very often be left out, as comparatively little unfixed coloring matter remains on the material. In other cases the old dye bath left after this could be used for its elimination. For accomplishing this a plant constructed on the principle shown in *Fig.* 2 could be employed with advantageous results.

This shows a short vat of iron lined with glass, or of copper with no lining, divided into four compartments (A, B, C and D), the first three of which are used for the dyeing operations, with a dye bath that enters in the first compartment (A), coming out at its top, entering the second compartment (B) through a tube at its bottom, making its way out of this also at the top, entering the third compartment at its bottom, running from this into the last, or rinsing compartment (D) in an exhausted state. The cloth (M) is entered at the top of the plant and is thus treated first in the dye bath at its fullest strength, then with the bath half exhausted, then with the bath fully exhausted, and finally with it having no further coloring power.

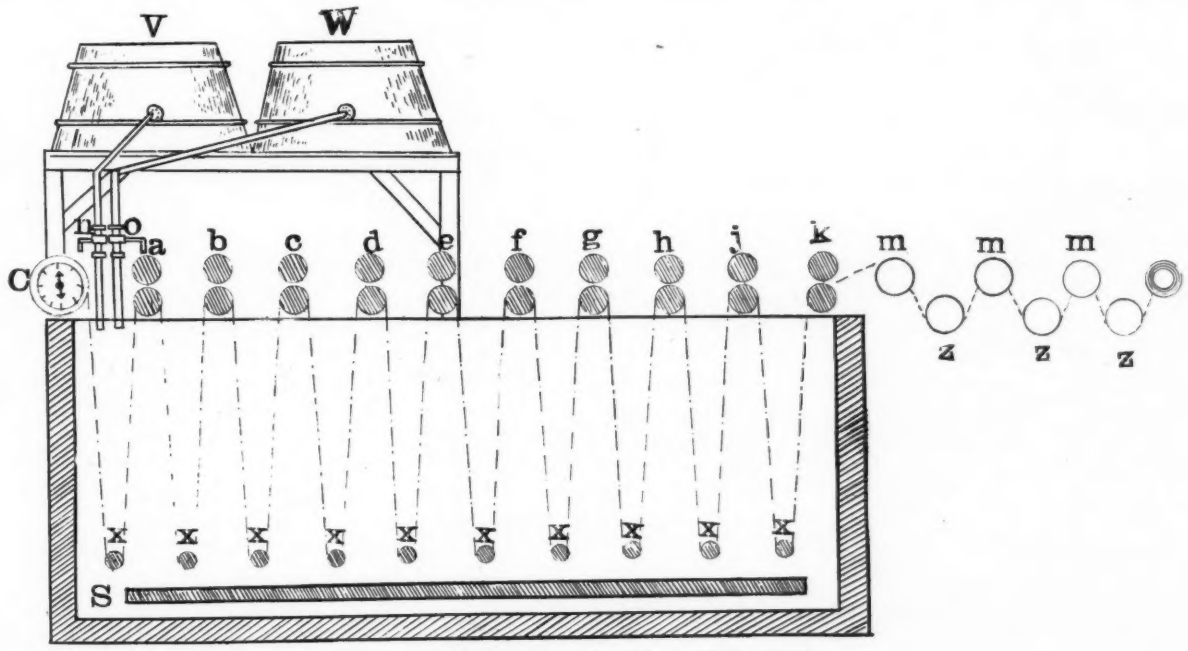



Fig. 3—*Plant for Dyeing Very Light Shades*

Steam is entered in this instance into the first compartment of the vat through a special tap (t) at its upper portion. For rendering more thorough the expulsion of the unfixed coloring matter, there is placed at the end of each compartment a pair of squeezing rollers (a, b, c and d). The plant contains a high entrance arrangement (E), and a perfected exit distribution frame (Z) worked by the same mechanism running the guiding rollers of the dyeing and rinsing compartments.

### Operation of the Plant

The working of the above plant would not differ greatly from the plant first described, the principle of which was shown in *Fig.* 1. The workmen, after having passed the usual cotton tape through the machine, would enter the dye bath, causing this to run through the three dyeing compartments, and afterwards through the single rinsing compartment.

The coloring matter solution required for the dyeing operations of the whole lot of cotton cloth would be prepared in a storage tank, or half-tub, at the back of the plant. A small sample of known weight should be dyed in a fixed volume of the same for exactly ten minutes before its use for the dyeing operations. By comparing the sample thus obtained with another, dyed simultaneously in an equal volume of a solution of a preceding dyeing it could be seen at once if the solution was too strong or too weak.

In the case of new colors to be matched, the dyeing is conducted by moving a sample of cloth, for the interval of time the material will be treated on a large scale, in the first compartment of the vat, then pressing it between squeezing rollers, again impregnating in the same bath, again pressing and again moving in the bath, observing also in these last two cases the same length of treatment as used on a large scale. The sample is then dried and compared with that to be matched. In this way a very fair control of the dye bath before its use for dyeing can be obtained, avoiding the later danger of irregularities in the dyeing operations on a large scale.

### Advantages

The advantages of the above plant are several and merit the attention of practical dyers. Some of them can be indicated as follows:

1. The use of the old dye baths for the rinsing operations also economizes on the dyestuff, for it is possible to give the final touches to the shade through its means.

2. The rinsing can take place either cold or at about the same heat as the dye bath, according to whether the dyeing is conducted in the cold or in the warm, and, in some cases, the heating can be conducted only in the first compartment, so that a portion of the dyeing takes place in the cooling-down bath.

3. In some cases all dyeing and rinsing operations can be conducted with clean condensed water, which is a very great advantage, especially when the water at the disposal of the dye works is not good.

### Dyeing Light Shades

When dyeing very light shades the above rinsing can be avoided altogether by adopting a plant constructed on the principle shown in *Fig.* 3.

This shows a single vat, having on its bottom a long steam coil (S), and a series of narrow diametered guiding rollers (x, x, x, x, x . . . . . .), and at its upper portion a series of squeezing rollers (a, b, c, d, e, f, g, h, i, j, k), and the leading-out rollers (m, m, m and z, z, z). At the opening of the vat is arranged a special measuring clock, through which the speed of passage of the cloth running through the plant is accurately recorded in seconds per meter.

This plant is supplied with a compensating device for the maintenance of a uniform speed in spite of momentary or prolonged fluctuations in the power driving the plant. In this way an irregular treatment of the material is avoided.

The upper portion of the plant is supplied with two half-tubs (V and W) sustained on a strong wooden framing, destined for the preparation of the dye baths required for the treatment, one tub being always left unused for cases of emergency, or for use when it is necessary to prepare a second color solution for dyeing immediately after the first. The taps (n and o) are also conveniently at one's disposal in this instance for regulating the entrance of the respective coloring baths.

### Operation of Plant No. 3

For working the plant the operatives prepare the dye bath, causing this to run slowly through the vat, entering at its upper portion and front, and making its exit at the end. When the above operations have been conducted the cotton cloth goods are run in also in this case thraugh the use of a cotton tape. The speed of the passage is regulated through a special device not shown.

### Advantages of This Plant

The above plant has several marked advantages, and there is no doubt that by applying its principle to the dyeing of other grays, and even to the dyeing of direct blacks and other coloring matters, some of these could be generalized. Below is given a small number of the more obvious advantages:

1. With the same dye bath, by employing four different speeds of operation, it would be possible to produce a very light, a light, a medium and a dark shade of the same gray, while circulating through the vat the same bath.

2. The numerous series of squeezing rollers, placed at the upper part of the vat, reduced very greatly the quan-

tity of unfixed coloring matter left on the material, thereby avoiding in many cases the necessity of a subsequent rinsing.

3. The dyeing operations can be conducted with stronger baths than those necessary for the dyeing operations through other means by running the plant very rapidly, thus greatly increasing its production.

*(Part IV will follow in an early issue.)*

# American-Made Colors

**A Classified List of All Dyes of American Manufacture, Giving the Name of the Maker and His Trade Name for Each Product**

## Group II.—Basic Colors

HEREWITH we publish the second installment of what we had hoped to make complete list of all colors at present manufactured in America, together with the names of their manufacturers. As stated in the last issue, our original purpose has been impossible of accomplishment for several reasons. In the first place, five or six manufacturers, either through indifference or disinclination, have failed to furnish us with a list of their products. Moreover, the list itself has been so long in compiling that many concerns who reported have undoubtedly added to their lines since the desired information was sent us.

We believe, however, that the list as printed is 90 per cent complete. In several cases, at least, the manufacturers themselves do not sell direct to the consumer but distribute their products through dealers or other manufacturers. We have purposely eliminated products of American manufacture sold through dealers under varying names and have endeavored to give only original sources of supply.

The list of colors when complete will include the following classifications: (1) Acid Colors—which has already appeared; (2) Basic Colors; (3) Chrome Colors, including Alizarines and pseudoalizarines; (4) Direct Colors; (5) Eosines and similar products; (6) Fur Dyes; (7) Nigrosines, Indulines and Oil Colors; (8) Sulphur Colors, and (9) Vat Colors. These classifications have been adopted as most suitable for ordinary use. Under each general classification the dyes have been divided into alphabetical groups according to the colors they produce—that is, blacks, blues, browns, etc. Under each color classification the products of individual manufacturers have been grouped together—that is, all Acid Blacks made by the National Aniline & Chemical Company, for instance, will be found together, as will all Direct Blues made by the Newport Chemical Works, etc. No attempt has been made to group identical or similar products together other than the general classifications above indicated, except in a few special cases where individual types are particularly well known or where there are marked differences in shade. We have not given Schultz numbers or pre-war names in any instance, although in a majority of cases we have this information on file.

So far as we know, this is the first attempt which has been made to compile a complete list of American colors. While it is admittedly not 100 per cent complete or accurate, it should at least form the basis for something which can be enlarged and developed in the future. Our main purpose is to supply consumers with a list of American colors presently available and to indicate their original sources. It was not thought necessary to give addresses of manufacturers, as these are well known in practically all instances.

We should have been glad to include products merchandised by dealers but this would have involved a great deal of confusing duplication of type colors, not to mention the countless mixtures upon the market under different names. We trust that our readers will examine carefully the lists as they appear and advise us of any errors or omissions which may be apparent in order that we may correct them at a later date. When the entire list is complete it is possible that we may publish it in booklet form, if the demand seems sufficient. In the meantime, however, we suggest that our readers keep the lists, as they appear, in their files for future reference. In the present installment we publish the Basic colors. Other classifications will follow in each succeeding issue until the list is completed.

### BLACK

Calco Neutral Grey
Calco Chemical Co.

Calco Methylene Grey
Calco Chemical Co.

National Basic Black BT
National Aniline & Chemical Co.

National Basic Black BG
National Aniline & Chemical Co.

National Black for Artificial Silk
National Aniline & Chemical Co.

### BLUE

Methylene Blue
Central Dyestuff & Chemical Co.

Calco Methylene Blue 2B
Calco Chemical Co.

Calco Methylene Blue 2BC
Calco Chemical Co.

Calco Methylene Blue Zinc Free
Calco Chemical Co.

Du Pont Methylene Blue B
E. I. du Pont de Nemours & Co.

Du Pont Methylene Blue Z
E. I. du Pont de Nemours & Co.

Du Pont Methylene Blue ZX
E. I. du Pont de Nemours & Co.

National Methylene Blue SP
National Aniline & Chemical Co.

National Methylene Blue BB
National Aniline & Chemical Co.

Methylene Blue
Reliance Aniline & Chemical Co.

Methylene Blue (Zinc Free)
Reliance Aniline & Chemical Co.

National New Blue DA Conc.
National Aniline & Chemical Co.

Du Pont Victoria Blue B Base
E. I. du Pont de Nemours & Co.

Du Pont Victoria Blue B Conc.
E. I. du Pont de Nemours & Co.

Du Pont Victoria Blue BX
E. I. du Pont de Nemours & Co.

Du Pont Victoria Blue R
E. I. du Pont de Nemours & Co.

Victoria Blue B
Butterworth-Judson Corp.

Victoria Blue Base
Butterworth-Judson Corp.

National Victoria Blue B Base
National Aniline & Chemical Co.

**BROWN**

Bismarck Brown R
Atlantic Dyestuff Co.

Essex Bismarck Brown R
Essex Aniline Works, Inc.

National Bismarck Brown 53
National Aniline & Chemical Co.

National Bismarck Brown R Base
National Aniline & Chemical Co.

National Bismarck Brown Y Base
National Aniline & Chemical Co.

National Bismarck Brown Y Extra
National Aniline & Chemical Co.

National Bismarck Brown D
National Aniline & Chemical Co.

Bismarck Brown R
Central Dyestuff & Chemical Co.

Bismarck Brown Y
Central Dyestuff & Chemical Co.

Bismarck Brown B
Grasselli Chemical Co.

Bismarck Brown TSS
Grasselli Chemical Co.

Dyelene Bismarck Brown R
Dye Products & Chemical Co., Inc.

Dyelene Bismarck Brown 2R
Dye Products & Chemical Co., Inc.

Dyelene Bismarck Brown 3R
Dye Products & Chemical Co., Inc.

Mohawk Brown
John Campbell & Co.

Mohawk Brown 2R
John Campbell & Co.

Du Pont Brown BR
E. I. du Pont de Nemours & Co.

Du Pont Basic Brown GX
E. I. du Pont de Nemours & Co.

Du Pont Basic Brown G
E. I. du Pont de Nemours & Co.

**GREEN**

Brilliant Green
Marietta Refining Co.

Malachite Green Powder
Dicks David Co.

Malachite Green Crystals
Dicks David Co.

Du Pont Victoria Green B
E. I. du Pont de Nemours & Co.

Du Pont Victoria Green Small Crystals
E. I. du Pont de Nemours & Co.

National Brilliant Green B Crystals
National Aniline & Chemical Co.

National Methylene Green B
National Aniline & Chemical Co.

National Victoria Green WB Powder
National Aniline & Chemical Co.

National Victoria Green WB Crystals
National Aniline & Chemical Co.

National Victoria Green WB Base
National Aniline & Chemical Co.

**RED**

Fuchsine TT Powder
Dicks David Co.

Fuchsine Crystals Small
Dicks David Co.

Fuchsine Crystals
The Sherwin-Williams Co.

Fuchsine
New York Color & Chemical Co.

Fuchsine (Large Crystals)
Cincinnati Chemical Works

National Fuchsine NB
National Aniline & Chemical Co.

National Fuchsine Pure Crystals
National Aniline & Chemical Co.

Du Pont Fuchsine Conc. Powder
E. I. du Pont de Nemours & Co.

Para-Fuchsine
Radiant Dye & Color Works

Para Fuchsine
Tower Mfg. Co., Inc.

Du Pont Rhodamine B
E. I. du Pont de Nemours & Co.

Du Pont Rhodamine B Base
E. I. du Pont de Nemours & Co.

Du Pont Rhodamine B Extra
E. I. du Pont de Nemours & Co.

Du Pont Rhodamine 6G Extra
E. I. du Pont de Nemours & Co.

Safranine
Reliance Aniline & Chemical Co.

Du Pont Safranine T Extra
E. I. du Pont de Nemours & Co.

National Safranine A
National Aniline & Chemical Co.

National Safranine 6B
National Aniline & Chemical Co.

**VIOLET**

Du Pont Crystal Violet Base
E. I. du Pont de Nemours & Co.

Du Pont Crystal Violet E
E. I. du Pont de Nemours & Co.

Du Pont Crystal Violet Powder
E. I. du Pont de Nemours & Co.

Crystal Violet 6B
Butterworth-Judson Corp.

National Methyl Violet 2B Powder
National Aniline & Chemical Co.

National Methyl Violet 2B Crystals
National Aniline & Chemical Co.

National Methyl Violet 2B Lumps
National Aniline & Chemical Co.

National Methyl Violet 2B Base
National Aniline & Chemical Co.

National Methyl Violet 5B Crystals
National Aniline & Chemical Co.

Methyl Violet
Holland Aniline Co.

Methyl Violet Base
Holland Aniline Co.

Methylene Violet
Holland Aniline Co.

Methyl Violet Crystals
Dicks David Co.

Methyl Violet Conc.
Dicks David Co.

Du Pont Methyl Violet NE
E. I. du Pont de Nemours & Co.

Du Pont Methyl Violet NP
E. I. du Pont de Nemours & Co.

Methyl Violet
New York Color & Chemical Co.

Methyl Violet
Tower Mfg. Co., Inc.

Methyl Violet
Central Dyestuff & Chemical Co.

Methyl Violet
Cincinnati Chemical Works

**YELLOW**

Du Pont Auramine O
E. I. du Pont de Nemours & Co.

Auramine
Marietta Refining Co.

National Auramine NAC
National Aniline & Chemical Co.

National Chrysoidine 3R
National Aniline & Chemical Co.

National Chrysoidine Y Extra
National Aniline & Chemical Co.

National Chrysoidine Base
National Aniline & Chemical Co.

Dyelene Chrysoidine R
Dye Products & Chemical Co., Inc.

Du Pont Chrysoidine R
E. I. du Pont de Nemours & Co.

Du Pont Chrysoidine G
E. I. du Pont de Nemours & Co.

Chrysoidine RS
Grasselli Chemical Co.

Chrysoidine Y Extra
Grasselli Chemical Co.

Calco Chrysoidine Y
Calco Chemical Co.

Chrysoidine R
Central Dyestuff & Chemical Co.

Chrysoidine Y
Central Dyestuff & Chemical Co.

Chrysoidine RA
Atlantic Dyestuff Co.

Mohawk Orange
John Campbell & Co.

Phosphine N
Dicks David Co.

National Phosphine 3RN
National Aniline & Chemical Co.

National Phosphine GN
National Aniline & Chemical Co.

# Artificial Silk and Its Applications in the Textile Industry

**Chardonnet Silk—Cuprammonium Silk—Viscose Silk—Acetate Silk—Dyeing of Artificial Silk—General Properties of Artificial Silk**

**By P. E. KING, A.I.C.**

*Department of Color Chemistry and Dyeing, University of Leeds*

*A Paper Presented in Connection with the Annual Meeting of the Federation of Lace and Embroidery Employers' Associations by Arrangement with the Textile Institute, and Printed in the Journal of the Institute*

TO-DAY there are four varieties of artificial silk manufactured. In the order of their greatest production they are: (1) Viscose, (2) Cuprammonium, (3) Chardonnet, (4) Acetate or Acetyl Silk. Possibly, the order of (2) and (3) may be interchanged. However, historically, I shall treat them in the order: (1) Chardonnet, (2) Cuprammonium, (3) Viscose, (4) Acetate Silk.

## (1) Chardonnet Silk

Chardonnet or nitro-cellulose silk originated in a patent taken out by Count Chardonnet in the year 1884, but it was fifteen years later before it achieved commercial success. One might therefore say that this industry is only twenty years old. The starting point or raw material for Chardonnet silk is cotton. This is purified and nitrated in a similar manner to that for the production of gun cotton, but the degree of nitration is less. The nitro compound in a wet state (thereby giving less anxiety on account of fire) is dissolved in a mixture of alcohol and ether, giving a highly viscous solution. After filtration under great pressure, the clear solution is forced through fine openings (between two and ten one-thousandths of an inch in diameter) in glass tubes to form filaments of artificial silk. The filaments, on emerging from the openings, are coagulated by the rapid evaporation of the solvent and a number are caught up to form a thread and the thread wound on to a running bobbin. The number of filaments taken up to form a thread depends on the size of the threads, the size as with all artificial and real silk being taken in deniers. The spinning apparatus is enclosed in a cover, and a current of warm, damp air passing through carries the vapors of ether and alcohol away to be condensed in amyl alcohol. Distillation of the latter refurnishes in great part the alcohol and ether used. During drying, the fiber becomes strong, lustrous, and elastic. The silk at this stage is still nitro-cellulose, and was first marketed in this form. But, owing to its inflammability, bad keeping qualities and difficulty of dyeing, attempts were made to remove the nitro groups. This is accomplished by means of a solution of ammonium sulphide, practically all the nitrogen being removed and the resultant thread being much less inflammable and

still lustrous but weaker. After bleaching, the commercial thread is obtained. I would like to point out here that the silk is regenerated cellulose or cotton, only in another physical condition. Hence it will dye similarly to cotton and mercerized cotton. This type of silk is still being manufactured at Tubize, in Belgium, about four to five tons per day being produced. Factories for the production of nitro silk were at one time in operation in France, Germany, Belgium, Italy, Hungary, and its production was also attempted in this country, but without success. Lehner's silk is also nitro silk and made in a similar manner, but the viscosity of the solutions was diminished by suitable additions, enabling less pressures to be used in spinning, and the filaments were spun in water.

### (2) Cuprammonium Silk—Also Called "Glanzstoff," "Pauly," "Cuprate"

Nitro silk enjoyed great prosperity for a number of years, but had to give way gradually before its new rivals —in the first place cuprammonium, and secondly viscose. It was thus owing to the prosperity of the nitro silk manufacture and partly through its difficulty of manufacture that new methods were looked for, and this brings us to cuprammonium silk. Although here again a Frenchman took out the first patent, it was the Germans who first produced the silk on the large scale. Cotton has been, and still is, the raw material for this variety, but wood pulp is, I believe, also being used. Whichever raw product is employed, its subsequent treatment (apart from initial purification) is entirely different to the Chardonnet process. The purified cotton, preferably mercerized, is dissolved in cuprammonium solution, also called Schweitzer's reagent, which is dark blue in color and obtained by dissolving copper hydrate in ammonia. This solution is usually prepared by passing air through a solution of ammonia. This solution is usually prepared by passing air through a solution of ammonia containing copper turnings. The copper dissolves in about twenty-four hours, the temperature always being kept low. The cotton, immersed in this solution and agitated, dissolves. After filtration, the blue viscous solution of cotton is forced in a similar way to the nitro process through glass jets into a coagulating medium. This medium may be one of several, but latterly was one of caustic soda and glucose. The threads are taken up on glass reels about six inches in diameter, and the thread traverses the length of the reel to and fro to keep them from becoming entangled. They are washed with acid to remove the copper, then in water and dried at about 50 to 60 deg. Cent., the thread is then twisted as much as desired (two and one-half to seven and one-half turns). A further slight leaching may be necessary.

A modification of the cuprammonium process was that devised by Thiele, who put up a small factory at Yarmouth to manufacture the silk. The chief difference was that he produced for the first time very fine filaments approaching real silk in size. The silk being finer closely resembled real silk, and it was less lustrous than the coarser artificial threads. His method consisted in drawing out a thick filament to a much finer one before being fully set or coagulated. The method was novel, in that the spinning solution was prepared by impregnating the cellulose with a solution of copper sulphate—precipitating copper hydrate by addition of caustic soda, filter pressing, and dissolving the mass in ammonia. The solution was also kept four weeks before spinning. This method, although producing some beautiful silk, did not achieve commercial success. Cuprammonium silk is manufactured at various places on the Continent, chiefly at Elberfield, and also in this country, and more recently the very fine filament silk has been produced. The Thiele process yields a rather dull fiber. I should like again to point out that this variety is regenerated cellulose or the original cotton in another physical form, and therefore will dye like the vegetable fibers.

### (3) Viscose Silk

This variety was the third to achieve commercial success, and, as you are well aware, is being to-day manufactured in increasing amounts, both in this country, on the Continent, and in America. It is entirely English both as regards the chief patents and its later and successful development. The solution for the production of this silk was patented by Cross, Bevan and Beadle—1892 to 1898. Stearn patented the first spinning process in 1890. Topham patented the centrifugal receiver since so largely used for the spinning of viscose silk, but it was not until 1905 that Messrs. Courtaulds erected a factory at Coventry for its production, and it was a few years later before they achieved lasting success. Somewhat previous to this, it had been made in Germany, France and Belgium, but I think not so successfully as at Coventry. The raw material is wood pulp, used usually in the form of sheets called bleached sulphite wood pulp. The first operation is the conversion of the wood pulp into alkali-cellulose, and this is accomplished by steeping the sheets in a solution of caustic soda of 17 to 18 per cent strength. After squeezing out the excess of alkali, the alkali-cellulose is ground into a crumblike mass in a mill. These crumbs were originally matured in closed boxes out of contact with air and kept at a low temperature, as this method was thought to give the best results in spinning. It was, however, discovered in 1913 that oxygen was essential to this maturing process. This oxidation can be controlled and accelerated by the use of suitable oxidizing agents such as sodium peroxide; also by the addition of certain catalysts in conjunction with sodium peroxide this oxidation can be enormously accelerated. These catalysts are the salts or oxides of certain metals—nickel, iron, etc. The usual process is to steep the pulp in caustic soda containing the sodium provide together with the catalyst, or the wood pulp may be previously impregnated with the catalyst before immersion in the caustic soda

(*Continued on page 329.*)

# Bleaching and Dyeing Jute

**Properties of Jute—Preparation—Bleaching and Dyeing—Methods for Dyeing Low-Priced Upholstery Fabrics—Use of Acid Dyes—Sulphur Dyes—Printing**

THE introduction of jute as a textile fiber was started in 1792, when the botanist, Roxborough, studied the cultivation of jute in the neighborhood of Calcutta for the India Company of England. It required, however, more than twenty years of exploitation to perfect the culture of the plant in India and to instill proper appreciation of the jute fiber for textile purposes. The Crimean War, 1855, and the American Civil War, 1863, deprived England at first of Russian hemp and then of American cotton, and these factors gave the necessary impetus to the large importation of jute into Europe.

## Properties of Jute

Jute is a fiber obtained from several varieties of *Corchorus* growing in India. The fiber is characterized by a rather unequal breadth, and a consequent variation in the diameter of the central canal. The diameter of the fiber itself varies from 0.01 to 0.03 mm. When examined under the microscope, especially when stained with the proper reagents, jute is easily distinguished from other fibers. For instance, when treated with strong nitric acid containing vapors of nitrous acid (Boussingault's reagent) the jute fiber gives a red coloration. Iodine and sulphuric acid give a deep yellow color; ammoniacal-copper solution swells the fiber but slightly. On treatment first with dilute chromic acid and then adding a little sulphuric acid, the fiber gives a blue color. With aniline sulphate a yellow or deep orange color is produced.

Jute is easily frayed by usage and friction, and does not possess in this respect the durability of linen or hemp. In the natural condition jute contains about 11 or 12 per cent of moisture, and in a damp atmosphere it readily absorbs as high as 30 per cent of moisture.

## Preparation of Jute

In the manufacture of jute yarns the fiber is carded or combed, the latter product, of course, being more costly. As the fiber has neither good softness nor elasticity it must first be oiled and worked in order to give it sufficient suppleness for spinning. For this purpose it is customary to use 25 to 30 per cent of a suitable oil emulsion. Usually mineral oils or fish oils are employed emulsified in water with soap and caustic soda. Sometimes vegetable oils are used holding in solution gums and resins emulsified with soda or ammonia.

Jute is usually dyed in the unbleached condition, but where employed for draperies and upholstery fabrics, in order to obtain cream colors and bright and clear tones it is necessary to give the fiber a half or full bleach, as the case may demand. It is only the best qualities of jute, however, that are treated in this manner, and generally it is the combed jute that is used. This character of fiber possesses a clear transparent yellowish tone, has a very uniform fiber, a high degree of luster, and is softer than ordinary jute. For many years this material has been used in combination with cotton wool, mohair, and even silk, for the manufacture of certain qualities of carpets (Lannoy), upholstery fabrics, draperies, jute velvets, and other similar materials.

## Bleaching of Jute

For the bleaching of jute it is necessary first to boil out the goods with soda ash or soap in order to eliminate the natural gummy products, as well as the various impurities and oils introduced in the process of spinning. Hypochlorite of soda (or Javelle water) gives better results in bleaching than solutions of chloride of lime, as in the former case there is no formation of insoluble lime compounds.

For bleaching jute yarn the material is treated for one hour at a temperature of 80 to 90 deg. Fahr. in a solution of chloride of lime standing at about 1 deg. Tw. The goods are then rinsed and soured in a bath of dilute sulphuric acid (1 deg. Tw.), then thoroughly rinsed a second time and dried. The bleaching of 100 pounds of jute will require about 22 gallons of chloride of lime liquor of 12 deg. Tw. and about 1½ pints of sulphuric acid.

Jute cloth is usually bleached with sodium hypochlorite. The goods are first passed through a weak solution of sodium silicate (water glass) containing about one pint to 25 gallons of water at a temperature of 160 deg. Fahr. Without rinsing, the goods are then run into the sodium hypochlorite solution (containing about 1 per cent of active chlorine) and left there for one and a half to two hours. Then rinse and scour with dilute hydrochloric acid (1 deg. Tw.), to which should also be added a small quantity of sodium bisulphite to act as an anti-chlor. After souring, the goods are well rinsed and then finished.

In order to obtain a higher degree of bleach and one which will remain more permanent, it is recommended that after bleaching with the sodium hypochlorite and souring, to steep for two hours in a cold solution containing one ounce of potassium permanganate to 25 gallons of water. The goods are then run through a weak bath of sodium bisulphite (4 deg. Tw.), acidulated with hydrochloric or sulphuric acid, which will remove the brown color caused by the treatment with the permanganate. The goods are then thoroughly washed, and should be a good full white color. This method of bleaching is better than using chloride of lime to obtain the

same degree of bleaching, as the color is better, and at the same time the strength of the fiber is better preserved.

### Dyeing of Jute

Jute contains tanninlike substances which cause the absorption of many dyes directly which ordinarily can only be applied to vegetable fibers with the aid of suitable mordants. From the point of view of dyeing, therefore, the jute fiber occupies a position intermediate between wool and cotton, as it may be dyed in a neutral bath or in a weakly acid bath.

The class of coloring matters generally known as the basic dyes are applied directly to jute in a neutral bath. On account of the comparatively low solubility of the basic dyes and the insolubility of their bases it is necessary to employ a good quality of soft water in dissolving the dyestuffs, and also for the preparation of the dye bath. The use of hard water tends to form tarrylike substances with the basic dyes, and it is necessary to filter the dye solution through a fine sieve or through cloth. If only hard water is available for the dye bath it should be "corrected" before use by the addition of acetic acid. For each degree of hardness (in parts per million) there should be used 16 c.c. of acetic acid to 1,000 gallons of water.

The basic dyes exhibit a great affinity for the jute fiber, so the dye bath should be started cold, and only gradually heated to about 180 deg. Fahr. In order further to facilitate the production of uniform colors by retarding the velocity of the dyeing process, there may be added to the dye bath a small amount of alum or acetic acid, especially when light tints are being dyed. These additions may be properly omitted, however, when dyeing heavy shades. A further precaution to be observed in the production of uniform dyeings is to add the solution of coloring matter in several portions rather than all at one time to the dye bath. The dye baths, as a rule, exhaust completely; that is to say, the fiber takes up the entire amount of coloring matter from the solution. This is true even in the dyeing of heavy shades.

The group of dyestuffs known as the *eosines* (phthalein dyes) are used in a very "short" bath, a bath containing as little water as possible, with the addition of a large quantity of salt in order to decrease the solubility of the coloring matter, and thus cause it to be taken up more completely by the fiber. The dye bath should be started lukewarm and gradually raised to the boil, and kept at that temperature for about half an hour in the cooling bath in order to absorb the dyestuff as much as possible. After dyeing, the goods are squeezed or hydro-extracted and dried without rinsing, as otherwise a good deal of the color will be removed. As this class of dyes is employed for the production of bright delicate tones of pink, it will be necessary to use half or full bleached jute to obtain a satisfactory color. As the dye bath exhausts rather poorly, it should be kept for use in the dyeing of subsequent lots, being freshened up to the necessary degree by the addition of further quantities of the dyestuff solution.

### Methods for Dyeing Low-Priced Jute Upholstery Fabrics

*Dark Blue for* 100 *Pounds of Jute.*—Prepare a bath containing 5 pounds of alum, 5 ounces of Madras Blue P, and 2 ounces of grenadine dye in a jigger with a short bath and give six runs or ends with the blue added first; then add the grenadine and give five runs, then continue running the goods while heating the bath to 180 deg. Fahr. for half an hour. For the dyeing of jute skeins, vats of 250 gallons capacity, as ordinarily employed in cotton dyeing, may be conveniently used. As jute skeins, however, are a good deal longer than cotton skeins, it will be necessary to place raised supports on the sides of the vat to hold the sticks or rods from which the jute skeins are suspended. It will also be necessary to use larger and stronger dyesticks than are required for dyeing cotton skeins, owing to the much greater bulk and weight of the jute.

*Maroon for* 100 *Pounds of Jute.*—Use a bath containing 5 pounds of alum, 3 ounces of Paris Violet (methyl violet), 8 ounces of Bismarck Brown, and ¾ ounce of magenta (fuchsine). Conduct the dyeing in the same manner as for the blue, but use about twice the proportion of water, as these basic dyes are readily taken up by the jute, and if a short bath were used the color would perhaps develop unevenly. It is generally unnecessary to rinse after dyeing with these colors.

*Bright Red for* 100 *Pounds of Jute.*—Prepare the dye bath with 1 quart of acetic acid, 1 pound of safranine and 1 ounce of Auramine O. Start the dyeing lukewarm and gradually raise the temperature to 160 deg. Fahr.

*Bluish Green for* 100 *Pounds of Jute.*—Prepare the dye bath with 2½ pounds of alum, 1 pound of malachite green, and 3 ounces of Methylene Blue 4B. Dye on unbleached material, and make the addition of color in two portions, giving six turns between the additions. This method gives a very bright clear green, and is more economical than with other dyestuffs.

For the production of yellowish greens or olive shades the above dyes may be combined with the natural dyes, fustic or cutch. The latter are added to the bath after the basic dyes have been taken up by the fiber. Alum combines with the fustic to give a clear yellow tone, while the cutch gives a yellowish brown color. As both these wood dyes contain tannin, they serve to fix more thoroughly the basic dyes.

### Use of Acid Dyes

The acid dyes are used on jute in an acid bath. As the jute fiber is attacked by mineral acid, it is recommended to use acetic or formic acid, alum or aluminum sulphate. The latter compounds act on jute in a manner somewhat similar to the action of sulphuric acid on wool. In carry-

ing out the dyeing process the jute is entered in the lukewarm bath, which should be as short as possible. The temperature is raised to the boil and maintained at that point for half an hour, then the goods are worked for another half hour in the cooling bath. The usual proportions employed in dyeing are 2 per cent (on the weight of the goods) of dyestuff and 2 to 5 per cent of alum. The acid dyes do not give colors on jute as fast to washing as the basic dyes, but they are generally faster to light. There is a group of acid dyes (including sulphone cyanines, alkali violet, and alkali blue) that is dyed in accordance with the method used for the application of the substantive dyes.

The following examples illustrate the use of the acid dyes:

*Golden Yellow for* 100 *Pounds of Jute.*—Use a dye bath containing 5 pounds of alum, 2½ pounds of citronine, and 1½ ounces of Orange II.

*Ponceau Red for* 100 *Pounds of Jute.*—Use a bath containing 5 pounds of alum, 2½ pounds of brilliant croceine, and 3 ounces of Ponceau 3R.

If a number of lots are to be dyed the same color, the bath may be used over two or three times, being freshened each time by the addition of about one-half the amount of alum and about one-fifth the amount of dyes taken.

Sulfo Green J, Acid Violet 5B, acid magenta, Acid Red S, Ponceau 2R, brilliant croceine, acid brown, tartrazine, and metanil yellow are acid colors which are largely used for the dyeing of jute. The soluble blues and sulphonated rosanilines are also used.

### Use of the Substantive Dyes

The substantive or direct cotton dyes are applied to jute in a boiling neutral bath, using as short a bath as possible, with the addition of 20 per cent (on the weight of the goods) of Glauber salt or common salt. In the dyeing of heavy shades it is recommended to leave the goods in the cooling bath for some time, so that the fiber may take up as much color as possible. As the baths are not exhausted, they may be used for the dyeing of subsequent lots in the same manner as with the acid dyes, adding sufficient of the coloring matter to produce the required shade. The colors obtained with the substantive dyes are characterized by a good fastness to water, and also they usually have good fastness to rubbing. The color also penetrates the fiber well, and leaves it softer than when acid or alum is used. The colors obtained with the substantive dyes may be shaded by a top dyeing with a small quantity of basic dye.

The following examples illustrate the use of substantive dyes:

*Bright Yellow for* 100 *Pounds of Jute.*—Use a bath containing 20 pounds of common salt and 12 ounces of Direct Yellow J. This color has great fastness to light.

*Bright Red for* 100 *Pounds of Jute.*—Use a bath containing 2 pounds of soda ash, 20 pounds of Glauber salt, and 2½ pounds of Congo red.

*Black for* 100 *Pounds of Jute.*—Use a bath containing 25 pounds of Glauber salt and 3 pounds of Erie black.

It will be noted from these examples that the kind of salt used in the bath may be varied; the yellow, the red, and the black can all be dyed with either Glauber salt or common salt, but the dyer soon learns the special properties of the coloring matters he uses, and will modify the composition of the bath according to circumstances. Congo red and benzopurpurine dye better with the addition of soda ash or soap.

The substantive dyes do not furnish very bright shades, but their tone may be made more brilliant by top dyeing with a minute quantity of corresponding basic dye.

### Use of Sulphur Dyes

The sulphur dyes are only rarely employed for the dyeing of jute, and only when it is particularly necessary from the point of view of fastness. Many textbooks advise that these colors may be applied to jute in just the same manner as to cotton, but owing to the difference in the nature and properties of jute this is not quite true. The usual method must be modified in that the soda ash should be omitted and the dyeing should be carried out at a lower temperature. The following shows the composition of the bath for dyeing sulphur colors on 100 pounds of jute:

| | Light Shades, Lb. | Medium Shades, Lb. | Heavy Shades, Lb. |
|---|---|---|---|
| Dye for first bath | 3 | 5 | 10 |
| For standing bath | 2½ | 4 | 6 |
| Sodium sulphide, cryst | 6 | 10 | 20 |
| For standing bath | 5 | 8 | 12 |
| Glauber salt | 10 | 20 | 40 |
| For standing bath | 1 | 2 | 4 |

The colors obtained with the sulphur dyes should be well rinsed after dyeing. As a rule, they possess good fastness to light and washing, but have the disadvantage of being dull in tone.

### Use of Vat Dyes

The vat dyes, although sometimes recommended for the dyeing of jute in cases where colors of great fastness are desired, are very seldom used. Their cost is high, and the methods for their application are relatively difficult and not very suitable if we consider the nature of the jute fiber and the relative cheapness of the fabrics made therefrom.

Outside of its use for the finer textile fabrics indicated in the foregoing paragraphs, by far the chief use of jute is the preparation of bags. Though the jute for this purpose is chiefly used in the natural color, there are occasions when it is dyed, and this is usually done in a rather crude manner. The hanks of the coarse jute yarn are

not hung on sticks nor previously boiled out nor softened, but are simply thrown in large wooden dye vats holding about 250 gallons of water, which is suitable for dyeing about 220 pounds of jute. The material is moved about by large poles, and after dyeing the goods are thrown out on poles above the vats so that the liquor may drain back. The goods are then hydro-extracted and dried without rinsing. The dye liquor is kept as a standing bath, and is used many times, being freshened up with sufficient water and dyestuff to bring the bath up to the proper strength and volume. After a time the impurities extracted from the jute accumulate in the bath and render it unfit for further use, so that the preparation of a new liquor is necessary.

By this method of dyeing it is not possible to obtain very even colors, but the results are satisfactory for the quality of the goods, and the process is very cheap, which is the chief consideration. The dyes chiefly employed for this class of work include Congo red, soluble blue, methyl violet, sulphone green, magenta, croceine orange, auramine, and direct black. The sulphur dyes are never used for this class of goods.

### Printing of Jute

The preparation of yarns for printed jute fabrics is about the same as for dyed goods as far as scouring and bleaching are concerned. To illustrate the methods of printing jute, a formula will be given showing the applications of each group of dyestuffs.

*Printing with Acid Colors.*—Prepare a color paste containing 30 grams of Orange II (or any other suitable acid dye), dissolved in 320 c.c. of water; 50 grams of acetic acid (30 per cent); add with constant stirring to 500 grams of thickener A (containing starch, gum tragacanth, and acetic acid); and finally add 100 grams of aluminum acetate liquor (10 deg. Be.). Print, dry, steam for one hour without pressure. The addition of the aluminum acetate gives the dyeings a somewhat brighter tone and makes them somewhat faster. The colors, however, are not fast to washing.

*Printing with Basic Colors.*—Use 20 grams of magenta (or other suitable basic dye) dissolved in 160 c.c. of water; 100 grams of acetic acid (30 per cent), thicken with 600 grams of thickener B, and add 120 grams of tannin-acetic solution (1:1). Print, dry and steam without pressure for one hour.

*Printing with Substantive Colors.*—Boil up together 30 grams of Erie black (or other suitable substantive dye); 90 grams of white starch, 100 grams of tragacanth paste (65:1,000), and 750 c.c. of water; then add 30 grams of sodium phosphate. Print, dry, and steam without pressure for one hour.

Thickener A mentioned in the formula for acid colors is made by boiling together 125 grams of white starch, 25 grams of dextrin, 100 grams of tragacanth paste (65 parts of gum to 1,000 parts of water), 100 grams of acetic acid (30 per cent), 25 grams of olive oil, and 625 c.c. of water.

Thickener B used with the basic colors is prepared in a similar manner with 140 grams of white starch, 275 grams of tragacanth paste (65:1,000), 275 grams of acetic acid (30 per cent), and 310 c.c. of water.

In the case of the acid and basic dyes the brilliancy of the colors may be enhanced by steeping the jute after printing in a bath of sodium stannate of 3 deg. Be. for several hours, and then fixing the tin in the fiber by passing through a bath of sulphuric acid at 1½ deg. Be. Then rinse well, and dry. If the printing is done on yarns these aftertreatments are not used. In the case of cloth, after being thus treated, the goods are dried, then brushed, beetled, and finally lightly calendered in order to obtain as clear an impression as possible.—Rev. Text. Chim. Col., through Posselt's Textile Journal.

---

## IMPROVED WOOL SCOURING

What is claimed to be an improvement in the process of scouring wool consists in the addition of potassium alginate to the scouring liquor. It is the subject of a patent recently granted a resident of New York, and Textiles gives the following account of the new process:

In scouring wool it is customary to use water containing various soaps and compositions. Better results can be obtained by using in connection with the scouring solutions more or less potassium alginate. The potassium alignate may be used alone as a suitable solution, or it may be dissolved in any of the ordinary scouring baths. Alginic acid is a complex body of unknown constitution occurring in various seaweeds of the nature of kelp. It is a gummy or amorphous material of acid nature, and is wholly insoluble in water in the free state, but is taken into solution by caustic soda or caustic potash to form extraordinary viscous or gummy solutions. The compound formed with soda or with potash is called an alginate. Alginic acid may be made from seaweed by extracting the weed with caustic soda, and precipitating the resultant solution with any convenient acid such as sulphuric acid. It is best to scour with several successive baths, used on the counter-current principle. More or less soap is used in connection with the potassium alginate. Its use is not absolutely necessary, but gives better results. Any convenient commercial soap used for scouring wool may be used in connection with the alginate. Still more advantageous results are obtained by making the soap at the same time that the potassium alginate solution is prepared. A desirable composition for the present purposes may be made by dissolving four parts of ordinary commercial caustic potash in eight parts by weight of water and adding one part of dry commercial

alginic acid in powder form and three ounces of any suitable fat, such as tallow or oil, such as cottonseed oil. Heat may be used to facilitate reaction. The result is a thick liquid or soupy mass. The wool is passed successively through four vats. In the first vat is placed a solution of the composition just described in the proportions of about one pound to, say, 100 pounds of water. This vat is kept at 120 deg. Fahr.

After successive lots of wool have been scoured in this vat and the solution becomes exhausted, the liquid may be treated for separating potash salts, lanolin, greases, etc. The residual liquid may be treated to recover alginic acid, potash, etc. In order to recover alginic acid, the liquor may be simply acidulated with sulphuric acid, whereon alginic acid separates as an insoluble body. The wool is passed to the second vat, in which a somewhat weaker solution of the composition is placed. That bath may be made by dissolving 1½ pounds of the composition in 200 pounds of water. The temperature in this second scouring is kept at 115 deg. Fahr. In the third scouring a still weaker solution is used, say, 1½ pounds of composition to 400 pounds of water. The temperature is maintained at 110 deg. Fahr. In the fourth water is used for rinsing. When the second bath has been used for a time, it is strengthened by the addition of a little potassium alginate and used for the first bath. In the same way the third bath after a period of use may be strengthened and used for the second bath. The water in the fourth vat after being used for rinsing for a time may be employed in making up the bath for the third vat.

# Lime in the Dyehouse

**Fallacies Concerning Lime—How Lime Should Be Used—Addition of Rosin—Liming Kiers—Wool Scouring—Constitution of Textile Lime**

**By ELTON R. DARLING**

*Professor of Chemistry, James Millikin University, Decatur, Ill. A Paper Read Before the U. S. National Lime Association*

THE use of lime in the textile industry can be divided into two classes; the first includes those operations where the greatest amount of lime is required and offers the most fertile field for research. These are:

Lime boil.
Softening water for dyeing, etc.
Recausticizing of waste caustic liquors.

The second class includes those processes which require only a small tonnage, such as—

Liming kiers.
Dyeing.
Preparation of chemic.
Scouring of wool.

The introduction of lime into the textile industry on a large scale has been more or less hampered by tradition, lack of technical knowledge regarding its use, and other causes. As an example that lime has been condemned without proof, it has been stated that the iron present in lime is sufficient to discolor the goods when used in the lime boil. Research work recently completed shows that iron in much larger amounts than it occurs in the average lime will not affect the color of the goods.

There are in the United States over 200 plants making a specialty of bleaching and finishing cotton yarn and piece goods. I have written to practically every one of these plants in regard to the use of lime. Only about one-half answered, but the replies were satisfactory. When a digest was made of them it was found that 3,300 tons of lime were being used for the treatment of cotton goods in what is known as the lime boil. If all of the caustic soda used in the textile industry (not including that used for mercerizing) was replaced with lime it would require between 200,000 and 250,000 tons. This gives you some idea of the possible tonnage of lime in this one operation. Lime cannot, however, entirely replace caustic soda as there are certain grades of goods that work better with a caustic boil than they do with a lime boil.

## How Lime Should Be Used

First, I shall consider the lime boil as this is a very important operation in the finishing plant and one which should be given close study. The constituents of the raw cotton are amido compounds, cellulose, coloring matter, pectins, proteids, tannic soda, oil, wax and such other matter as is added to assist in the spinning and weaving of the fiber. These materials with the exception of cellulose must be removed as completely as possible. To accomplish this the goods are boiled in various strengths of solutions of caustic soda, and to a limited extent, in weak milk of lime.

Our interest is in the process making use of lime. The lime is first slaked and then shoveled upon a screen suspended over a tank fitted with an agitator. A stream of water is then directed upon the screen, washing the lime into the tank where it is kept in constant agitation. The screening operation is necessary as nothing but slaked lime must enter the tank, as any small pieces of unslaked lime when taken by the goods will later slake and cause burning. The lime is next run into the liming machine where the goods are saturated with it.

The milk of lime is made of such strength that when the goods leave the rollers of the liming machine they carry an amount of calcium oxide equivalent to about 2 per cent based on the weight of the goods. As the goods enter the kier they are plated down and when the kier is full they are wedged, so as to prevent them from rising and becoming tangled during the boiling operation. When ready, water is run in until the goods are covered and then the kier cover is dropped into place and clamped down.

Experiments show that the open kier is not to be recommended for lime boils. With the pressure kier, when operated under chemical control, in comparison with a similar kier using caustic soda, it was found that the lime produced the desired results in one-half the time required by the one operating with caustic soda. When a test was made using the open kier it required the same time for the lime to boil as it did for the caustic boil.

About twenty-five pounds pressure of steam is required and the time of boiling depends upon the grade of goods. Usually this runs from four to ten hours. When the boil is complete the kier is blown down and the goods given a rinse in the kier. The goods are then pulled from the kier, run through a washing machine and returned to the kier for the second boil, which is required to decompose the lime soaps which are formed in the first boil.

This is done by running in a 1.5 per cent solution of soda ash until the goods are covered, when the cover is clamped down and the boil made. The pressure required for this operation is only about five pounds. Like the first boil the period varies with the grade of goods and is less than six hours. The kier is again blown down, the goods rinsed in the kier, run through a washing machine and sent into process.

### Addition of Rosin

In the second boil the bleacher often adds a little rosin together with the soda ash as an emulsifier in removing the fatty matter. This operation is not to be recommended for white goods as it is liable to lead to yellowing when the goods are stored.

One of the most efficient compounds that can be used in connection with the soda ash boil is sulphonated castor oil. This product, whose true value is not recognized, is capable of forming a water soluble lime salt and thus leaves the goods in a much better working condition. Not only is it of value in this connection but also in almost any other process where the removal of lime is necessary.

One thing required in the textile industry, and one that plays an important part in the success of the finish on the goods, is water. Here the lime-soda ash softening process can be employed with marked success.

Large quantities of caustic soda go to waste from the various processes in the treating and finishing of cotton goods. This can be easily recovered and some steps are now being taken to effect this. This problem is especially acute in those cities and towns which have enacted laws preventing the running of large amounts of alkali into the water supply.

### Liming Kiers

Liming kiers is an operation which is carried out to prevent the goods from coming in direct contact with the iron walls and being stained. A milk of lime solution is prepared consisting of five pounds of unslaked lime and fifty pounds of water. The entire inner surfact of the warm kier is painted, using a broad brush. When complete the kier is closed and steamed for about twenty minutes, then allowed to cool. A second coat is then applied and the steaming repeated, when the kier is again ready for use. Before the kier is given a new coat all loose lime should be removed. Many kier stains result from a lack of proper liming at frequent intervals.

Some textile plants manufacture their own solution of chemic from lime and chlorine, instead of preparing it from bleaching powder. For this either quicklime or hydrated lime can be used. The first operation is the preparation of the milk of lime solution, which requires 110 pounds of hydrated lime or eighty pounds of quicklime to every 250 gallons of water, and 100 pounds of chlorine. The milk of lime solution is run into an iron tank and the chlorine introduced at the bottom of the tank bubbles through the solution, setting up agitation and causing the absorption of the gas. During the addition of the chlorine the temperature of the mixture must not rise over 70 deg. Cent.

When the absorption is complete the solution is allowed to stand, when the sludge settles out leaving a clear solution of calcium hypochlorite which is drawn off for use. Another method of preparation is to carry out the absorption of the chlorine in an absorption tower. This method is rather expensive and one best adapted to the larger plants.

### Wool Scouring

Recent work carried out using lime for the scouring of wool has opened another interesting field in the textile industry. It is still in the experimental stages, but the results are promising.

In the various dyeing processes a small tonnage of

lime is required. This is usually the hydrated form and used to replace chalk. One of the most important uses for the hydrated lime is in the fixing of metallic salts upon the fiber, subsequent to the dyeing operation. It also finds use in the new Turkey red process when the goods are run through a bath of milk of lime to fix the alumina in a basic condition. It is again used to insure the proper depth of shade in the dye bath. In the dyeing of alizarine on chromium mordants, lime is used to fix the basic chromium compounds subsequent to the dyeing operation. Vat dyes require that the bath be kept in an alkaline condition and the occasional addition of lime has worked with marked satisfaction.

### Constitution of Textile Lime

To arrive at something definite regarding the specifications of a lime for the textile industry is difficult. No uniformity of opinion was obtained when the textile men were approached on the subject. Wide margins were given as to the actual calcium oxide contents, this running from 85 to 95 per cent. Magnesium oxide was looked upon as dangerous and should not be present except in very small amounts. Iron oxide, it was found as the result of research, does not produce the effects that the average bleacher is led to believe it does, although the amount present should not be high. The same is true of silica.

After much experience with lime I consider a product that is uniform in color, not lumpy, and very reactive chemically with a calcium oxide content of at least 94 per cent, with less than 2.5 per cent of magnesium, 3 per cent of silica, and 2 per cent of iron and aluminium oxides well suited for lime boils. Limes used in dyeing should contain less than 1 per cent of iron oxide. It is better to employ hydrated lime for this purpose and the same is also true of the scouring operation.

Coming to the advantage of lime, in the first place, it is cheaper and safer to handle than the stronger alkalies. It reduces the number of uneven boils to a minimum. It gives the cloth a good bottom, which is an advantage for a firm, permanent finish. It is possible to effect a complete removal of the wax from the cloth when lime is used. Treatment with lime reduces the time required, when the pressure kier is used. It has great efficiency in removing proteid matter. Finally, the action is mild as compared to the harsh action of the stronger alkalies.

# Bleaching in Laundries

**Peroxide vs. Chlorine Bleaches—Difference Between Objective in Laundry and Textile Bleaching—Opinions of Supply Houses**

A LARGE manufacturer of chemical supplies has been investigating the matter of bleaching as employed in laundries and in textile plants. He has suggested the use of a peroxide bleach, stating that if anything is to come to the laundry-textile movement toward co-operation, both the laundry owner and the mill owner must adopt some perfectly wholesome process and neither can pass the buck to the other. Acting in his behalf, some questions were sent to a number of prominent laundry supply houses, and from among the replies the following are quoted:

"In reply to your letter, we do not think that this matter is being approached from the right angle, as we do not want to confuse bleaching in the laundry with bleaching as it is done in the textile industry.

"It is very unfortunate, indeed, that we have gotten into the habit of using the word 'bleach'; for in reality it is not a bleaching process in the laundry, and those who are entirely familiar with the operation recognize this. The action is one of stain removal, and there is a radical difference between the textile bleachery process and the washing process that is insufficiently emphasized.

"The process in the bleachery is to make the goods white, whereas in the laundry it is to remove stains that are not removable with soap, water and alkali. Considerable misinformation has gone forth in the laundry trade due to the misapplication of textile information.

"The 'bleach' in the laundry should be so proportioned that the stain removal is at its highest, whereas the destructive effect on the fabric is lowest. Such a 'bleach' would not do for the textile bleachery, but is unsurpassed in the laundry industry.

"As to oxygen bleaches, these are inferior to chlorine in their stain-removal power, and are not practical bleaches for the laundry. They are weak and costly, and are no safer, if used in the necessary amount.

"We have made a number of tests with 'bleaches' containing chlorine that are properly proportioned and constructed in order to remove stains, and we have shown definitely that in as many as sixteen washes there is no deterioration of the fabric whatsoever. We might have continued these tests indefinitely, but this test is a matter of record on our files."

"Sodium peroxide, or any peroxide bleach, must be used with wool and silk, because of the fact that the

chlorine bleach is too strenuous an agent for this purpose. In regard to cotton work, which is where chlorinated lime or similar products come in competition with peroxide bleaching, everything favors the chlorine bleach. Some manufacturers (for instance, of toweling, where the colored border or strip is woven into the towel prior to bleaching) must necessarily use peroxide bleaching because the colors are not capable of withstanding a chlorine bleach. Ordinary reds and blues may be bleached with a chlorine bleach, but lighter colors and more fugitive colors, such as green and heliotrope, must have the peroxide bleach used.

"We have in our laboratory some samples of bleached toweling from a large bleachery where both peroxide and chlorinated lime are used for bleaching, and it is quite evident that a better bleach is obtained with the chlorinated lime. The man in charge of this plant assured us that in his many years of operating experience on both that he had never been able to secure the quality of bleaching with peroxide that he had secured with chlorinated lime.

"There is another practical angle from which this must be considered also, and that is in regard to the relative cost of bleaching with two processes. With sodium peroxide at the present time at a price of 30 cents per pound, which is a very conservative, low figure, chlorinated lime in 10-pound cans at 8 cents per pound (as we put it out) runs about 68 per cent of the cost of sodium peroxide for the same amount of bleaching power, assuming in both cases the same percentage efficiency in use. With chlorinated lime in large containers, which, we understand, can be bought for 3 cents per pound, the percentage is 26, provided the chlorinated lime has full strength when used. In addition to this, sodium peroxide is a rather dangerous material to handle, since a piece of paper or wood which has sodium peroxide placed on it will usually take fire when a little water is sprinkled on the sodium peroxide.

"With reference to the effect of chlorine bleach on cotton fiber, we have not been able to find any statement in any of the authorities as to any weakening of the fiber where the bleach is used properly. It is entirely possible to weaken seriously the fiber by improper practice, but where properly used there seems to be no injurious effect whatever. There seems to be no reason, therefore, why the laundry industry and the textile industry cannot be in perfect accord on this, since most of the cotton bleaching is done by means of chlorinated lime and chlorine products rather than with the peroxide bleaching. It has been our experience, in furnishing supplies to the textile trade, that very few of them are using peroxide bleach for cotton work except where there are delicate colors employed which are more susceptible to injury by chlorine bleach than by peroxide bleach. In such cases the effect of strength on the cotton fiber does not enter into the consideration.

"We trust that the above will state our position in this matter thoroughly enough to you, and if you should see fit we should like to see a published statement as to the conclusion reached on this inquiry regarding peroxide bleaching.

"Relative to the merits of chloride of lime as compared to other available media for use as a textile bleach, we will try to give you our opinion in the matter, simply stating facts as we have had occasion to find them, and not attempting to place blame on either mill owner or laundry owner.

"First, it must be admitted that any treatment, be it chemical or physical, that impairs or reduces the tensile strength of a textile is undesirable. Demands of the trade for white goods have forced mill owners to produce products which are very white. This is possible only at a sacrifice of wearing power, and when the laundry owner blames the manufacturer for producing such goods he does so on the fact that overbleached products are produced. The mill owner, on the other hand, caters to the wants of his trade and is not particularly interested in the likes or dislikes of the laundry owner.

"It seems that at various times bleaches have been offered to the trade which would produce the desired colors without the objectionable features of reduced tensile strength, but these have often cost so much more or required such a longer amount of time to produce results that the mill owners could not afford to continue the use thereof.

"However, in defense of the mill owner we must admit that the washing and bleaching processes as found in the modern steam laundries sometimes leave much to be desired. Textile chemistry is something that the average washman knows nothing about, and these chaps work more by rule of thumb than by rule of reason. After proper or careful treatment in the washroom, a textile should show very little loss in wearing strength, and it is possible to improve over some of the present practices. Textiles washed right require little or no bleach, and a correctly washed load in the wheel will have the color desired.

"Behind the entire discussion, in our estimation, is that trade demands have forced both the mill owner and the laundry owner to produce color, and in satisfying these demands the products must necessarily suffer. Competition has forced production costs to a minimum, and until a bleach is developed that can compete with chloride of lime in price there is not much hope of displacing the objectionable features which will remain as a bone of contention between the mill owner and the laundry owner.

"The writer has had occasion to go into this subject in connection with researches on laundry sours and has considerable data available on this subject."—Starchroom Laundry Journal.

AMERICAN
DYESTUFF REPORTER

Devoted to the use and application of dyestuffs and the mechanical equipment incidental thereto.

LOUIS A. OLNEY
PROFESSOR OF CHEMISTRY AND DYEING, LOWELL TEXTILE SCHOOL
*Advisory Editor*

LAURANCE T. CLARK
*Managing Editor*

Published biweekly by
HOWES PUBLISHING CO., INC.
4109 Woolworth Building, New York City

A. P. HOWES, *President* E. S. PREDMORE, *Secretary*

Subscription price $5.00 per year; Canadian $5.50; foreign $6.00.

Vol. XI October 23, 1922 No. 9

## FOREIGN RECOGNITION OF A NECESSITY

IF one would look abroad for evidences that America is not the only country in which the subject of technical control of the dye industry is being thought of, he need go no farther than England. The Proceedings of the Third Ordinary General Meeting of Shareholders of British Dyestuffs Corporation are rich in allusions to this particular phase of the general question: what is wrong with the industry?

Of course, this question boasts of more than the single side just mentioned, being, as everyone knows, distinctly polyhedrical in character. This side of it, however, we believe to be important enough to command the attention of the entire industry even before some of the others are approached, and to this end we have repeatedly given it prominence in these columns and shall continue to do so in the hope that the increasing sentiment in favor of placing technical experts at the head of the industry may become crystallized.

The present series of quotations and comment is an addition to past efforts to keep this need before readers of The REPORTER, and may be regarded as a continuation of the editorial entitled Executives for the American Dye Industry in the September 11 issue. This discussed an article in the Manchester Guardian by Professor Henry E. Armstrong, who made bold to criticize the technical ability of Sir William Alexander, Chairman of the Board of British Dyestuffs Corporation, and also that of the late Lord Moulton, and others. At the shareholders' meeting of the corporation, Sir William and some of his associates on the Board were again made the target for criticism of this nature, some of it rather sharp, and while it all ended happily, as we shall see, the apparent bitterness displayed on several occasions shows well that the subject is at least a live one among our British cousins. Unfortunately, it will be impossible to attempt an explanation of the context of everything quoted, for the reason that the discussion was too long and involved; further, it concerned itself with the operations of the corporation and would be of little value in considering the main subject. It will be understood, also, that The REPORTER subscribes to none of the accusations—nor denials either, for that matter—but is making use of them merely to show that the British dye people are deeply concerned to get the best possible control—which means technical control—for their enterprises.

We invite your attention, then, to one or two of the more interesting moments in the shareholders' meeting. Sir William, the chairman, has just finished discussing the report of the directors and the corporation's statement for the year, and has asked that both be accepted and approved.

Sir Joseph Turner, one of the directors, whose possible re-election to that position, Sir William stated, "the directors do not recommend," has arisen to reply.

After declaring his willingness to abide by any decision rendered by the shareholders, and commenting upon Sir William's figures as given in the statement, Sir Joseph said:

"Now these shareholders were told at these specially called meetings that our selling organization was not perfect, and that the Chairman of to-day had had to make many changes. I put it to you that as far as our selling organization in this country is concerned, our Chairman has made practically no changes. He has made changes so far as our foreign selling organization was concerned. He has placed at the head of affairs in that connection a man who knows practically nothing about aniline dyes. The same man has, also against my wish, been elected by the Board to be our representative on the Licensing Committee. So that you will see that these changes which have been made do not suggest added efficiency, and do not indicate on the part of the Chairman any real knowledge of the aniline dye industry. If his knowledge is so little that he is going to adopt the same policy in other directions as is indicated by his placing men in the positions I have described, then I can tell you that, though he has said that the position of the company was hopeless in days gone by when, by the way, we did pay a dividend, the situation is certain to be much more hopeless if that attitude is going to be maintained, and that policy is going to be carried on of placing men in such positions who know nothing at all of the aniline dye industry."

After discussing purchases, sales and financial transactions of the corporation at some length, Sir Joseph concluded:

"Our Chairman has told us that everything is in good order. I am prepared to say to-day that you have in your works hundreds of thousands of pounds' worth of plant and machinery, placed there for the manufacture of goods that the dye users of this country and other countries want, which has never turned a wheel. As a matter of fact, some of it is really not completed. For the sum of £10,000 or £20,000 it could have been completed and could have been earning money. Instead of this being so, you have not got a man about the company

who knows about that plant or who understands what it is for. Still less do they know what to do with it."

T. Parker-Smith next took the floor, and, referring to Sir William, said:

"The Chairman has stated in the printed report that he was appointed managing director in 1921. In his speech he rather led you to expect he was appointed managing director in August, but that was not so. He was appointed managing director in 1921. Now no one with any knowledge of a manufacturing business can feel for one moment that a gentleman who, give him the best name in the world, is a member of a firm which is simply buying and selling, acting as a broker for heavy chemicals, can understand the duties and the responsibilities and needs of the administration, control and direction, in all its manifold interests, of a large manufacturing business; let alone that most intricate of all businesses in the whole world, a dye and intermediate and heavy and fine chemical manufacture. No one who has not a very wide knowledge of proper administration, control and leading of men in the manufacture and applied to the manufacture of dyes could possibly be called competent."

Further along in the course of his remarks, Mr. Parker-Smith said:

"The Chairman has referred to some correspondence which I have had with him and others on the Board about the selling of dyes abroad. That was a matter I investigated when I went into it with the Colour Users' Association, and I venture to tell the Chairman that Congo Red, which has been sold abroad less than in England, is a color which does not deteriorate in quality. And the Chairman did not know that. It shows how much he knows. Now in looking at this balance sheet you have heard some of the reasons which have been given as the reason for the loss and the bad trading. We all recognize that our Chairman may be a judge of sales. He is chairman of a company which does a lot of selling. But, as I have said before, that does not show that a man has any knowledge of manufacture and the cost of manufacture. Now do you know this: that in a given period when £900,000 of dyes were sold by British Dyes, £1,250,000 in the same period has been imported from Switzerland (and not on a matter of price) that ought to have been manufactured at least in the British Dyestuffs works. And if it had been so manufactured the cost of productions would have been enormously reduced. Everybody knows that. But the control of this —you know the gentlemen, you see them all here. There is not one on the Board, with the exception of Sir Joseph Turner, who has practically ever been in a dyestuffs manufactory before he came to this Board. Now the main point we have to consider is, while we may have men who do not know much about dyes, we should have men who realize this essential factor that dyes should be sold. Now the Chairman has said—I wondered whether he would say it, but he has said—that his dyes are sold on an average of 3s. a pound. (A voice: 3s. 5d.) Well, 3s. 5d. I will give you 3s. 7d. if you like. Well, I am one of the unfortunate men who have not been able to strike that average and I think there are a great many more. I shall tell you how that average has probably been got at. Before the war British Dyestuffs did not manufacture Indigo and only a very small proportion of Sulphur Black, but to-day there are very large quantities concerned in the manufacture by this company, of big volume and weight, at a low price. For Indigo you are paying 1s. 9d. when it is being sold in the United States, with a plant on the same lines as our own, at somewhere about 1s. 1½d. But we will take it at 1s. 9d. And you know the price of Sulphur Black is somewhere under 1s. and that the quantity, which is far the major portion by weight and the lowest priced, is very easily able to set off the price of Malachite Green, which I know at 30 'bob,' and a good many other people by the price of their dyes. But this point must not be lost sight of: that notwithstanding the excessive price—I was supporting a resolution of the Colour Users' Association which we passed about the excessive prices of dyes and there was no man on that council but agreed that they are excessive prices. They are excessive as everybody here knows. Now if those prices had even approached the prices at which reparation dyes were being sold we should have had some satisfaction. But they are not. They are sold as much above as they can be. In the words as reported by the Chairman to me, 'We must get as much out of the Licensing Act as we can.' But what about the color users and the piece-goods industry of this country, competing against anybody else? I want to know, further, whether there is a possibility that, leaving out Indigo and Sulphur Black and similar things, we can get the proper synthetic dyes, the vat dyes which we use so much, down to a proper normal price. I have stated that up to the present aniline oil is sold at 1s. We had a fight, a terrible fight, to get it down. It is now being sold in America at 10d. Before the war—I will give you every advantage—it was 5d. a pound. To-day, I am assured the same conditions apply in the dyeing industry as to every other industry—that the wages of workmen are approximately 2½ times as much as pre-war. Now if you have your aniline oil not more than 2½ times pre-war, and your wages 2½ times, and a much better factory for doing it and a larger clientele, then I submit that, if reparation dyes are sold on the basis of prices that they are, at least the British Dyestuffs could easily cut under these prices. And I should go further. I cannot see any reason why a price three or four times the pre-war price should not leave them an excellent profit. It would, if there were any proper management in the works. Every other business has to do it. There are very few of us business men who can get three times the pre-war price. I should be jolly glad if I could. But these gentlemen ask a price for ordinary dyes running from 6s. to 10s. a pound, according to the different prices. But the average basis—our basis averages 9s.—for basic dyes in our trade and the pre-war price was

under 1s. We are paying nine times the average price for our dyes that we did before the war. I do not like that, and I say the whole reason of it is due to the incompetence of the Board, who cannot—and have not a single person on the Board to—control the manufacture of dyestuffs, and to see that the proper value is got out of the materials and out of the intermediates used, and that the qualities are right. Whatever he says, therefore, that is the true reason of the loss, not so much the dyestuffs and the stocks. Nothing like that. It is a very easy matter for any Board of Directors—we have seen it in other cases; the Chairman will always put it down to depreciation of stocks. It is so easy. But it is not so in this case."

We feel that we have quoted quite enough. There is much more of the same which we might give—but to what end? The point is that the question of real technical executives for any dye industry which would compete with Germany is a crying need, that nothing short of a technical training in *dyestuffs*—not merely "chemistry"—will do, and that this need is, perhaps, coming to be recognized abroad even more rapidly than it is here at home. And finally, that the sooner it is recognized and satisfied here, the better it will be for both dye makers and users.

We feel that the extracts given above cannot but be extremely interesting for their own sake as well as for the sake of what they reveal, and in justice to Sir William it is only fair to add that the shareholders wound up by giving him a vote of confidence, that he himself stated, "I do not claim to be an expert in dye making, but I claim to have some knowledge of the chemical manufacturing industry, and of the general principles on which any successful business organization must be run," and that he concluded the meeting by remarking:

"My Board will tell you that I had no wish to take command of this concern and it was only under very great pressure that I sacrificed my own personal interests in taking this business under control. I have no intention to remain with your company permanently, and have no dispute with Dr. Levinstein or those who say, 'You should have a controller who is both a technical and a commercial man.' I can assure you that the day on which I can hand over the reins of office to such a man will be the happiest day in my life. Meantime, I am only trying to bring this salvage together and get some spirit into the organization; and to leave the concern in such a way that when such a man as you seek comes in, he can take over the business with more pleasure and less worry than I am having."

---

The dedication of the new Sterling Chemical Laboratory of Yale University will occur on April 4, 1923, during the spring meeting of the American Chemical Society at New Haven. This arrangement has just been completed by national officers of the society and officials of the Yale Corporation.

## ARTIFICIAL SILK AND ITS APPLICATIONS IN THE TEXTILE INDUSTRY

(*Continued from page* 318.)

and peroxide. Without going into the chemistry of this oxidation too much, this invention has enabled the process to be shortened and solutions of cellulose to be produced of varying viscosities so that viscose silks possessing different qualities may be obtained. The next operation is the production of the cellulose xanthate by the action of carbon bisulphide on the matured alkali-cellulose. By this reaction is formed a brown gelatinous mass with which is dissolved in dilute caustic soda. This compound has the composition:

(Cellulose)

$$\text{NaS}\left\{\begin{matrix}1\\ \\ \end{matrix}\right\}\text{CS} \qquad (1)$$

*i. e.*, is composed of the original wood pulp, caustic alkali and $CS_2$ but by hydrolysis (change) it breaks down, losing carbon bisulphide and forming successively

(Cellulose)

$$\text{NaS}\left\{\begin{matrix}2\\ \\ \end{matrix}\right\}\text{CS} \qquad (2)$$

and

(Cellulose)

$$\text{NaS}\left\{\begin{matrix}3\\ \\ \end{matrix}\right\}\text{CS} \qquad (3)$$

*i. e.*, the proportion of cellulose or wood pulp in the compound gets larger and the caustic soda and sodium smaller. The process is called aging, and must not be carried too far, otherwise cellulose hydrate would be formed and the solution would not spin. Generally, spinning is carried out when the composition is between (2) and (3).

The solution, after thorough filtration and removal of air bubbles, is forced through jets usually consisting of platinum or some other metal and perforated with a number of fine holes. The spinning bath in which coagulation takes place usually consists of sulphuric acid, ammonium sulphate and glucose, but other baths may be used, depending on the thread required and the composition of the xanthate. The actual spinning is most usually carried out in a Topham centrifugal box. The thread, after leaving the coagulating bath, passes over a roller, through a vertical reciprocating tube into a circular box rapidly rotating on a vertical spindle. The centrifugal force throws the thread to the side of the box, where it builds up into an annular cake. A certain twist is also imparted to the thread by the rotation of the box. When the box is full the cake is removed and wound into skeins. The crude viscose silk is thus obtained. Subsequent purification is carried out by removing the sulphur with a bath of sodium sulphide, washing and bleaching. The production of this silk has been enormous during the last few years, and there are probably thirty factories producing it to-day.

Again, it must be mentioned that this product is a regenerated cellulose, and therefore dyes similarly to vege-

table fibers, but more intensely. More recently, the production of fine filament viscose has been accomplished—the outcome of work by Bronnert. Using the same aperture for ordinary viscose, by merely altering the strength of the acid spinning bath, various sizes of filaments can be obtained down to ¾ denier per filament. The size of real silk is 1¼ denier. The same spinning speed can be preserved, *i. e.*, forty to fifty meters per minute.

In this new process for fine spinning, it is important to maintain a maximum concentration of acid for each count. Brilliancy in the fine counts might be varied at will and without any damage to the strength of them. To get an opaque thread, reduce the temperature. By raising the temperature to 80 to 50 deg. Cent., a thread of more and more brilliancy can be produced.

### (4) Acetate Silk

We now come to the most recent of artificial silks, that termed acetate or acetyl silk. This, as you are aware, is coming on to the market and is creating a great amount of interest. Acetate silk differs from the other three varieties in this important respect: the silk as sold is not regenerated cellulose, or the original raw material is a different physical form, but cotton or cellulose containing the acetic acid groups in combination with it; or, to put it another way, it is the same chemically as that dissolved in the solvent for spinning. For some years before 1914, attempts had been made on the Continent to exploit this process, but without lasting success. During the war the manufacture of cellulose acetate was carried out in this country, but this was used as a dope for aeroplanes. Since then the cellulose acetate has been successfully used for the production of artificial silk. Cotton or wood pulp forms the starting point or raw material. This, after purification, is converted into a compound containing acetic acid or what is chemically termed an acetyl compound of cellulose. One may compare this compound with the similar nitro-cellulose, except that acetic acid replaces the nitric acid. This derivative is dissolved in acetone and the solution filtered. The viscous solution is then forced through fine openings in a metal cap, the issuing filaments are coagulated by a current of warm air, and the solvent recovered as far as possible. The filaments are then brought together to form a thread, to which is then given the requisite twist.

Subsequent treatment is similar to that for other silks. It is interesting to note that the composition of this silk corresponds chemically to approximately the di-acetyl derivative, *i. e.*, the treatment with the acetylating agent is not carried to its ultimate stage, the tri-acetyl compound. On account of this fact, the silk is more easy to wet out with water than the tri-acetate would be.

### The Dyeing of Artifical Silk

As I have previously pointed out, Chardonnet, cuprammonium and viscose silks are all regenerated cellulose or at least cellulose combined with water. They are thus similar chemically to mercerized cotton, and the dyestuffs and dyeing methods which are used for the dyeing of these three types of artificial silk are the same as used for cotton. However, these three types do differ somewhat from each other in the degree of dyeing. Chardonnet silk, owing to residual traces of some sulphur compounds, can be dyed with basic colors without a mordant. Even for full shades, mordanting with tannic acid and tartar emetic is in most cases unnecessary if no special degree of fastness is required. If the shades require to be faster to water, washing, and cross dyeing, mordanting is essential.

Direct dyestuffs have less affinity for Chardonnet silk than either cuprammonium or viscose silks. In its dyeing properties, cuprammonium silk closely resembles mercerized cotton, and the direct cotton dyes are generally the most suitable: with basic colors a previous mordanting is essential even for light shades. Viscose silk is very similar to cuprammonium as regards dyeing, but basic colors dye viscose deeper than cuprammonium silk, though not so strongly as Chardonnet. With viscose, light and medium shades may be dyed without a mordant, but deep and fast shades require a preliminary mordant. Sulphur and vat colors can be used for the production of fast shades on all these products.

Thus, you will see that these three varieties can be woven along with pure silk, cotton or wool, and the resultant pieces dyed in the piece—looking upon the artificial silk from a dyeing point of view as mercerized cotton and adopting precautions necessary for the artificial silk taking color more strongly. By this, I do not mean that you can use either silk at will and expect to get level results more than you would by using different qualities of wool in the same piece. Neither do you always get level results when using the same artificial silk: it is important to keep different batches apart as far as possible.

Coming now to acetate silk, we have a fiber differing chemically from the three just mentioned and therefore differing in its dyeing properties. To just go back to its manufacture, acetic acid is attached to or chemically combined with the cotton or wood pulp used, or, to give it its chemical name, cellulose. The point I wish to lay stress upon is that contrary to nitro or Chardonnet silk, where the process of denitration removes the nitro groups or the nitric acid part of the compound, with acetate silk this is not done and the commercial thread contains acetic acid in its composition. We have therefore a similar thread to the original Chardonnet (in which the nitro groups were not removed) in that acetate silk will not directly dye with direct cotton colors, or that the affinity between dye and fiber is very slight. The same remark applies to dyeing with the sulphide colors and also vat colors.

However, if the acetic acid is partly removed by a suitable treatment, dyeing will take place with these groups of dyes. This method of dyeing is called the "saponification" method. It consists in treating the silk in a hot

bath with a specified quantity of caustic soda to remove an equivalent amount of acetic acid so that the silk approaches more nearly to its original condition, that is, cellulose. The degree of dyeing should be proportional to the amount of caustic soda used. This method does not always produce even results; to be perfect the amount of saponification must be equal throughout the surface of the filament. This is not always easy to control, so that unequal saponification takes place, more in one place than another, with consequent uneven dyeing. Complete saponification, *i. e.*, a regeneration to cellulose, is not desirable, on account of the loss of luster sustained and also loss of silklike properties, also loss of weight. The process may be carried out in two ways, either by the one bath method in which the alkali and dye are in the bath together so that dyeing proceeds simultaneously with saponification, or the saponification may be carried out first and the dyeing operation then conducted subsequently in a similar manner to other silks. By this saponification method, the direct cotton, basic, sulphur, and vat dyestuffs may be applied. The one bath method is not to be recommended. The temperature at which these operations are carried out is of very great importance: whether in saponification or dyeing a temperature of 75 deg. Cent. is the maximum that should be employed. A recent patent says that caustic soda saturated with common salt gave a more even result.

We will now proceed to the dyeing with those dyestuffs which have a direct affinity for acetate silk, and of these the basic group of dyestuffs stand out most prominently. Taking the animal fibers into consideration for one moment, we know that wool and silk possess both what are called acid and basic properties or are capable of functioning as an acid or basic substance. Hence, both wool and silk will dye with both acid and basic dyestuffs without any preliminary treatment, that is, because with basic dyes both fibers act in their acid capacity and with acid dyes in their basic capacity. Now taking cotton, the chief representative of vegetable fibers, and with this we can, of course, associate wood pulp. In this case we have a fiber with no pronounced acid or basic properties, and with the absence of these is explained its non-dyeing property with either acid or basic dyes. But cotton can be dyed with basic colors by giving it acid properties, and this is accomplished by mordanting it with tannic acid, after which the dyeing with basic dyes is easily carried out.

Now you will see the reason why acetate silk will dye directly with basic colors: it is owing to the retention of the acetic acid combined with the cellulose or cotton that confers acid properties on the fiber, and hence dyeing with these colors takes place without mordanting. A very remarkable phenomenon here occurs. The basic colors as a class are extremely fugitive to light, but some dyed on acetate silk are extremely fast: Malachite Green on acetate silk is very fast to light, but extremely fugitive on tannined cotton or wool. Others are similarly fast to light, but also a number are no faster on this silk than on cotton, and in one case the reverse is the case—Methylene Blue is fairly good to light on cotton and wool but fugitive on acetate silk. There are some other dyes strictly belonging to the mordant class which have, however, a good affinity for acetate silk. This is due to the basic properties of the dyestuffs: these are termed Gallocyanine dyestuffs. Also a few acid colors are capable of dyeing very good shades, but these are of a less pronounced acid character. In fact, ordinary acid colors containing sulphuric acid in any quantity in their composition will not dye acetate silk.

Lastly, we have dyeing acetate silk by the "development" process. Reverting for one moment to the similar method for dyeing cotton: in this case cotton is actually dyed by colors which, however, owing to their chemical constitution, are capable of reacting with nitrous acid on the fiber (called the diazotization process) and then these new compounds coupling with organic compounds, such as naphthol, diamines, etc., to form in reality new dyes much faster to washing, etc., than the original color. Primuline is, of course, the well known example of this class.

Acetate silk absorbs very freely substances such as amines, phenols, etc., and, with the amines, a similar procedure can be carried out as I have just mentioned, *i. e.*, diazotizing the amine and the formation of a color by its coupling with other phenols, amines, etc. The difference is that with cotton the first compounds put on are already dyestuffs and can be used in many cases without aftertreatment; but with acetate silk the preliminary amines, etc., are mostly colorless, and colors are only developed by coupling the body.

This process, although, of course, somewhat long, is capable of producing very fine shades—fast to light and washing. Care has to be taken with deep shades to avoid loss of luster, and, further, with deep shades, rubbing is liable to occur.

### General Properties of Artificial Silks

As regards luster, they are all more lustrous than real silk, acetate being somewhat of a quieter luster. Cuprammonium generally possesses a hard, glasslike luster, and this is useful where strong effects are desired, as in laces, edgings, etc. The smooth rounded section of its filaments made it good for braiding or knitting. When spun in fine filament, the luster is duller. Chardonnet and acetate sometimes show (what is said to be a defect) glittering points or specks. Viscose silk is very lustrous. Acetate silk is a non-conductor of electricity and also of heat, and it feels somewhat warmer to the touch than the other silks.

It has been stated by Wilson that, with viscose silk, by alteration of the composition of spinning bath and of the spinning liquid, fibers of varying shapes of cross section and thus of different luster, covering power, dyeing affinity, etc., can be made. Its fibers may be either smooth and round or irregular and serrated in cross section or

with other variations. He stated that the other silks do not possess this property, but have generally a smooth outline, with consequently less luster and covering power. These statements have been lately verified by Bronnert, who has by variation of the baths produced many types of viscose silk which are particularly adapted either for braiding, weaving, or knitting.

## SILK PEOPLE OFFER PRIZE FOR BEST 1923 SILK SHOW POSTER

The poster of the First International Silk Exposition was so beautiful and attracted so much favorable comment, that Howard Greenley, architect and art director, has decided to inaugurate a competition to secure an unusual design for the Second Silk Exposition, which will be held in the Grand Central Palace, February 5 to 15, 1923. This competition will give art students and poster artists an opportunity to show their skill in handling a subject that offers a very wide field for imaginative treatment.

Four prizes will be given for the most meritorious designs submitted: First price, $50; Second prize, $25; third prize, $15; fourth prize, $10.

"The completed design for a poster for reproduction is not contemplated in this competition," said Mr. Greenley. "Sketch designs embodying the idea for the poster are sought. They should be in three or four colors, should not exceed a dimension of 12 by 18 inches, and should feature the primary idea of an exposition devoted entirely to the display of silks. A motive symbolizing the fabric, or the industry, and not a special department of the industry—such as costume, for example—is indicated as a desirable feature of the composition, although it should have the poster quality of suggesting instant interpretation."

The following lettering must be incorporated in all designs submitted:

SILK SHOW
GRAND CENTRAL PALACE
FEBRUARY 5-15, 1923

If the winning competitor indicates sufficient knowledge of poster design and color technique, the execution of the finished poster may be given to the individual so qualifying, with proper reimbursement. In any event the ideas embodied in the designs submitted shall be considered as available as poster suggestions to the Silk Association of American and the Silk Travelers' Association under whose auspices the competition is held.

All drawings must be delivered to Room 712, Flatiron Building, New York City, Monday, November 6, before 12 noon, with the name and address of the competitor in a sealed envelope, and the package plainly marked "Silk Show Poster Competition."

The result of the competition will be announced during the week of November 11, 1922.

Princess Finishing Company, Inc., Providence, R. I., has been incorporated to manufacture, bleach, dye, etc., yarns, fabrics, etc. Capital, 2,500 shares of no par value. Incorporators: Eugene A. Risley, Cranston; William E. Reddy, West Warwick, and Charles I. Burlingame, Providence.

---

Combier et Cie., Inc., Dover, Del., has been incorporated to manufacture silks, velvets, etc. Capital, $100,000. Incorporators: Moses B. Seigman, Henri Devigne, Mason H. Bigelow, New York City, and Thomas F. Bayard, Wilmington, Del., agent.

---

The Kentucky Color & Chemical Company, Louisville, has ordered additional grinding machinery and will double the output of its Shawnee C. P. chrome green department.

---

STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC., REQUIRED BY THE ACT OF CONGRESS OF AUGUST 24, 1912, OF THE AMERICAN DYESTUFF REPORTER.

Published biweekly at New York, N. Y., for October 1, 1922.

State of New York, County of New York, ss.: Before me, a notary public in and for the State and county aforesaid, personally appeared Alfred P. Howes, who, having been duly sworn according to law, deposes and says that he is the publisher of the American Dyestuff Reporter and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management, etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, embodied in section 443, Postal Laws and Regulations, printed on the reverse of this form, to wit:

1. That the names and addresses of the publisher, editor, managing editor and business managers are:

Publisher—Alfred P. Howes, 4109 Woolworth Building, New York City. Editor—Louis A. Olney, Lowell, Mass. Managing Editor—Laurance T. Clark, 4109 Woolworth Building, New York City. Business Manager—Alfred P. Howes, 4109 Woolworth Building, New York City.

2. That the owners are: Howes Publishing Co., Inc., 4109 Woolworth Building, New York City; Louis A. Olney, Lowell, Mass.; Alfred P. Howes, 4109 Woolworth Building, New York City; Derfla H. Collins, Upper Montclair, N. J.; Mary K. Howes, Northampton, Mass.; N. H. Hiller, Carbondale, Pa.; William F. Collins, Upper Montclair, N. J.; Jos. L. Schroeder, Hartsdale, N. Y.

3. That the known bondholders, mortgagees and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages or other securities are: None.

4. That the two paragraphs next above, giving the names of the owners, stockholders and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association or corporation has any interest direct or indirect in the said stock, bonds or other securities than as so stated by him.

A. P. Howes, Publisher.

Sworn to and subscribed before me this 16th day of September, 1922.

[Seal] Arthur K. Brice.

(My commission expires March 30, 1923.)

*1816* CHEMICALS *1922*

*"Over a Century of Service and Progress"*

**BLEACHING POWDER**

**FINISHING MATERIALS**

**FORMIC ACID**

**COLORS**

**GUMS and WAXES**

**DYESTUFFS** **CAUSTIC SODA**

**INNIS, SPEIDEN & CO.**

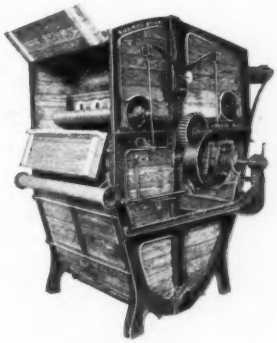
*Manufacturers, Importers, Exporters of Industrial Chemicals*

**46 Cliff Street** **New York**

BRANCHES:

Chicago Philadelphia Boston Cleveland
Gloversville, N. Y.

**STANDARDIZE**
**on**
**Rodney Hunt Washers**



*(Ask for Booklet 221)*

**Scouring and Rinsing**

**Woolens, Worsteds, Cottons, Knit Goods**

**Rodney Hunt Machine Co.**
**40 Mill Street** **Orange, Mass.**

**Latest 1914 Berlin Edition of**

**"FARBSTOFFTABELLEN"**

By Dr. Gustav Schultz

Containing over 1000 dyestuff formulæ reprinted and exactly reproduced by photographic process on fine white paper, and substantially bound in heavy black cloth and leather.

Can now be had from us at $10 per volume.

**HOWES PUBLISHING COMPANY**
**4109 Woolworth Building, New York**

# IRON FILINGS
# IRON DUST

## FOR CHEMICAL PURPOSES

A concern located in New England, which is in a position to supply large quantities of the above materials, is anxious to get in touch with dyestuff or other manufacturers who use them in their processes. Dealers' inquiries will also be welcome. Screenings to special specifications can be made where volume of business warrants.

***Please communicate with***

**American Dyestuff Reporter**
**4109 Woolworth Bldg. New York City**

# "A Good Advertiser Is a Safe Borrower"

UNDER the bank cashier's wicket every day pass thousands of dollars in loans to the manufacturers of America. They make automobiles or soap, adding machines or candy, talcum powder or furniture.

Why do these business men borrow large sums with confidence?

Because by persistent *Advertising* they have each created in the great buying public a demand for a particular automobile, a special brand of candy, a particular make of furniture.

They judge the future by the past. What advertising has done, it will do, and do increasingly. There is an inexhaustible fund of good-will for the advertised trademarked product. An idea is sold to the public and kept sold by well planned reiterated Advertising.

[ Published by the American Dyestuff Reporter in co-operation with The American Association of Advertising Agencies ]

# THE NEWPORT COLORS

*Vat Dyes*

THE SUN

is the greatest chemist in all the universe, and just as eons ago it instilled into vegetation the elements we now withdraw for the production of color from coal, so is it endowed with the power of destroying these selfsame colors. To the ingenuity of man falls the task of combating this, and as a result of the endeavors of the chemist the famous series known as the

NEWPORT ANTHRENES

has been developed.

Of these the following types are now on the market:

Newport Anthrene Blue RS
Newport Anthrene Blue GC
Newport Anthrene Blue GCD
Newport Anthrene Blue BSP
Newport Anthrene Blue BCS
Newport Anthrene Yellow R
Newport Anthrene Yellow G
Newport Anthrene Brown BB
Newport Anthrene Green B
Newport Anthrene Jade Green
Newport Anthrene Black B
Newport Anthrene Dark Blue BO

NEWPORT
REG U.S. PAT OFF
"COAL TO DYESTUFF"

## NEWPORT CHEMICAL WORKS, Inc.

**PASSAIC, NEW JERSEY**

**Branch Sales Offices:**

BOSTON, MASS PHILADELPHIA, PA.
PROVIDENCE, R. I. GREENSBORO, N. C. CHICAGO, ILL.